

Communicating about heat stress

Analysing the heatplan of the municipality of Utrecht



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Abstract

Climate change is resulting in extreme weather events that are causing problems in the liveability of the city. These issues moreover affect human health. Therefore, is climate adaptation necessary, resulting in policies that include instruments and measures to reduce the impact of climate change. Heat stress is challenging to include in policies in the Netherlands. The inability to measure actions to prevent heat stress has led to vague and complex policies. However, new policies are being developed with measurements of cooling spaces and places.

This research analyses the effectiveness of the heat plan of the municipality of Utrecht, which communicates heat stress measures citizens can take during extreme heat events. This is done with a framework applied to this specific case and qualitative and quantitative research. Qualitative research is conducted through expert interviews, and quantitative research is carried out by conducting a survey.

Keywords: climate change, heat stress, Utrecht, heatplan

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Summary

After a bachelor's thesis in flood risk management, my interest was in heat stress measures. After multiple brainstorming sessions and conversations with my Master thesis supervisor, I decided to focus on the heatplan of the municipality of Utrecht about heat stress measures. The heatplan is a policy about how to communicate heat stress measures with the citizens of Utrecht during hot periods. After a short introduction, the research problem, aim, and questions are discussed. Furthermore, the societal and scientific relevance are discussed.

The main research question of this thesis is phrased as follows: *How effective is the implementation of the heatplan regarding the communication of heat stress measures with the not vulnerable citizens of Utrecht?*. The sub-questions that are answered are as follows: *How is the municipality of Utrecht implementing the heatplan?; What are the obstacles that the municipality of Utrecht is experiencing during the implementation of the heatplan?; To what extent is the municipality of Utrecht communicating the measures of the heatplan with the 'normal' citizens?*.

Regarding the societal relevance of this research, the following is being focused on. The aim of the heatplan is on the vulnerable citizen group. However vulnerable citizens are not included in this group. This research contributes to improving communication with the "normal" citizen group by analysing the heatplan, which can result in better knowledge about heat stress measures and therefore better health of the citizens. Regarding scientific relevance, this research contains qualitative and quantitative research methods. This mixed method approach gathers results on heat stress to result in a more holistic approach. The framework of Kabisch (et al, 2016) is used, which has not been done on heat stress in Utrecht or the heatplan itself.

To answer this research question, a quantitative and qualitative research method is adopted. In the methodology, these methods are explained alongside the research strategy, data collection and analysis. The validity and reliability of the research are described here.

In the literature review, multiple concepts are discussed to understand the theory better. Concepts for example, climate change, climate adaptation, heat stress, heat stress in the Netherlands, adaptation policy and instruments, adaptation policies in the Netherlands about heat stress, heat stress measures in the Netherlands and the case study in Utrecht itself.

In the theoretical framework, the concept of nature-based solutions is explained, following frameworks on analysing the effectiveness of policies and these nature-based solutions. Eventually is the framework from Kabisch (et al, 2016) explained thoroughly. This framework is used to analyse the heatplan of the municipality of Utrecht. The framework is about four indicators, where three of them are used; Transferability and monitoring; Health and well-being; and Citizens' involvement. After this explanation, the conceptual model is presented.

After all the theory is discussed the collecting and process of the data is described. Then the data analysis is explained, discussed in the discussion of the conclusion ending with the conclusion itself, which narrows it down to the following results. The municipality of Utrecht implemented a heat plan with a focus on policy development rather than improving the implementation. Local stakeholders are encouraged to contribute, and the plan is activated in coordination with the RIVM and KNMI. The municipality uses various communication channels, including social media, to raise awareness about preventing heat stress. This approach to heat stress involves both top-down and bottom-up strategies. Obstacles faced during implementation include difficulty reaching homeowners, no activation during vacation periods, and uncertainty about backup plans for other organisations. Privacy concerns make it difficult to identify all vulnerable citizens, and healthcare organisations might be more effective in reaching them. Communication efforts primarily targeted vulnerable citizens,

with uncertainty about how well "normal" citizens were informed. The municipality used social media however considered additional measures, for example, posters at general practitioners' offices and combining maps. The information about heat stress and its impact on vulnerable citizens is gradually spreading through various channels.

The effectiveness of the heat plan in communicating with non-vulnerable citizens is perceived differently. Creators rated it 3/3.5 out of 5, while citizens averaged a rating of 2.59. Both groups acknowledge the challenges in assessing effectiveness due to various influencing factors, including obstacles, communication measures, and the quality of information provided. The heat plan is seen as halfway towards becoming more effective, with improved communication targets crucial for its success.

1. Introduction

When there is a hot period, cities are significantly warmer than the countryside. This is because the heat gets stuck between the buildings of the city and because concrete warms up faster and stays longer warm than green nature does (Wavin, 2019). This phenomenon can cause heat stress. Heat stress is defined as a physical reaction of the human body to thermal stress (Di Napoli et al., 2019). Which can result in consequences for the physical health of the citizens of the cities, for example, illnesses and even death (World Health Organisation, 2008).

Regarding policies for communicating about heat stress in the city, Utrecht in comparison with other big cities for example, Amsterdam and Rotterdam, is the only one with a heatplan published on their website (Gemeente Utrecht, 2022; Gemeente Utrecht, z.d.; Gemeente Amsterdam, z.d.; GGD Amsterdam, z.d.; Gemeente Rotterdam, z.d.; GGD Rotterdam-Rijnmond, z.d.). This is not surprising because municipalities are having problems with knowing which demands they must focus on to develop a more heat-resilient city (Kluck et al., 2020). The municipalities of Amsterdam and Rotterdam do have information on their website on what to do with heat, however not a specific plan on how they are communicating this information with their citizens. This makes Utrecht an interesting case to research whether the plan about communicating that information is working because then cities for example, Amsterdam and Rotterdam could implement a heatplan in the future.

So far research about heat stress in Utrecht has been done in the form of risk mapping (McDevitt, 2022). However further research on how a certain policy about heat stress is functioning or heat stress in common has not been done. The heatplan developed by the municipality of Utrecht is a growing model. This means that after every summer it is evaluated for improvements and whether it functions or not (Gemeente Utrecht, 2022). When speaking of evaluating after the summer of 2023, here this research can contribute to improving the heatplan because it is not done yet.

1.1. Research problem statement

As climate change is increasing the weather conditions on earth are getting extreme. More rainfall in a specific time, more heat waves, and more storms. To reduce the impact of these extreme weather conditions on our society the city must adapt. The Netherlands is facing difficulties in trying to do so where the municipalities are faced with the challenge of ensuring that areas are designed or redesigned in a climate-proof way (Kluck et al., 2020).

Regarding handling heat in the Netherlands certain concepts are still unclear and in need of extra attention. For example, how electricity, transport networks, nature and infrastructures react under extreme conditions of heat. Moreover, what the full consequences of extreme heat on water facilities and health issues are. The Netherlands is an organized country however still set for the “old” climate, which results in an adaptation shortage. This is worrying because heat can result in big problems. Problems, for example, heat stress can result in more deaths and difficulties in daily life due to heat (PBL, 2015). This effect of climate change needs more attention on what to do to reduce heat stress (Kluck et al., 2020).

There are three measures which are tested to reduce heat stress. First, there is the distance that citizens need to walk to a cool area. Next, the percentage of shadow citizens will experience on the regular side-walk routes. Last, the percentage of green areas that are in each neighbourhood. These measures help analyse where there is room for more improvement in decreasing the heat stress impact on citizens. Therefore, the municipalities will know where to develop green areas (Kluck et al., 2020).

Many municipalities in the Netherlands are implementing heat stress measures (Kluck

et al., 2020). Aside from what the municipality must do to reduce heat stress, the municipality of Utrecht is communicating with citizens about what they can do themselves when there is a hot period or heat wave, where the citizens can see what the temperature in their neighbourhood will be, what the difference is in and outside the city, how far the citizens would have to walk for cooling areas and which places have enough or to less shadow and developing heat maps (Gemeente Utrecht, z.d.). When talking about communicating with citizens about heat stress, the municipality wrote a plan for this, called the heatplan (Gemeente Utrecht, 2022). The goal of the heatplan is to communicate about where citizens can find facilities, what they can do against heat and how they can help vulnerable residents and animals. Furthermore, communicating with intermediaries (care providers, neighbourhood teams, agencies, etc.) to help vulnerable residents (lonely elderly, homeless people) and point out how they can protect themselves in heat. Furthermore, communicate with institutions, businesses, and individuals where animals are kept pointing out that heat periods should be considered. In this plan, they focus on communicating with three types of groups: the ‘normal’ citizens, the vulnerable citizens, and companies with farm animals (Gemeente Utrecht, 2022). The groups of vulnerable citizens and companies with farm animals have a direct connection in getting information about heat stress measures. This is through communicating with healthcare organisations, caretakers, and the municipality itself that reach out towards these groups of citizens and companies. However, when it comes to the ‘normal’ citizens, it is only shortly described they contact them via the social media channels of the municipality of Utrecht and neighbourhood newsletters. The ‘normal’ citizens are not contacted directly by people around them or the municipality, for example, the vulnerable citizens are (Gemeente Utrecht, 2022). However, many citizens who are not perse vulnerable and are not directly contacted can experience fainting or other conditions than death, which can put unnecessary pressure on healthcare organisations or result in unwanted situations for example, accidents (PBL, 2015). The question is whether the contact via social media and neighbourhood newsletters about heat stress measures enough is for the “normal” citizens to understand what to do to prevent heat stress. When contact through social media and letters is not enough, direct contact with the “normal” citizens should be considered by the municipality. Knowing about what is in the heatplan when speaking of heat stress measures is part of good communication. It creates furthermore more citizens’ involvement and better implementation of the heatplan. This is important to create more effectiveness (Kabisch et al., 2016). The heatplan must be efficient to be more effective (Baker & McLelland, 2003). The question is, is the heatplan even working then for that group of citizens? Is it efficient? Is the heatplan of Utrecht effective enough in communicating the heat stress measures with the ‘normal’ citizens?

1.2. Research aim

The heatplan of the municipality of Utrecht (2022) has the goal of communicating heat stress measures with citizens, companies that contain animals and in specific vulnerable citizens. The research aim of this research is to analyse the effectiveness of the heatplan (Gemeente Utrecht, 2022) that the municipality of Utrecht has developed based on communicating heat stress measures with the citizens that are not placed in the vulnerable group. These measures are about where they can find facilities, what they can do against heat and how they can help vulnerable residents and animals. It is important to learn more about the effectiveness of the heatplan to research whether the heatplan is efficient or should be adapted in terms of communicating heat stress measures with the “normal” citizens. The analysis is done by looking into how the municipality of Utrecht is implementing the heatplan, what kind of

obstacles the municipality of Utrecht is experiencing during the implementation of the heatplan and analysing to what extent the municipality of Utrecht is communicating the measures of the heatplan with the 'normal' citizens. Therefore, the aim is to answer the uncertainty about the heatplan regarding effectiveness in communicating the heat stress measures with the citizens that are not categorized as vulnerable.

1.3. Research questions

The research question that is answered in this research is as follows:

How effective is the implementation of the heatplan regarding the communication of heat stress measures with the normal citizens of Utrecht?

The sub-questions that are answered are as follows:

1. How is the municipality of Utrecht implementing the heatplan?
2. What are the obstacles that the municipality of Utrecht is experiencing during the implementation of the heatplan?
3. To what extent is the municipality of Utrecht communicating the measures of the heatplan with the 'normal' citizens?

1.4. Social and scientific relevance

Societal relevance

The heatplan of the municipality Utrecht (2022) focuses on three types of groups: the 'normal' citizens, the vulnerable citizens, and the companies with farm animals. The group of 'normal' citizens are not contacted directly regarding the plan and the vulnerable citizens are contacted only through healthcare organisations. However, people who are old but still live at home and do not receive direct healthcare, are not contacted directly on what to do against heat stress because they do not have connections with healthcare organisations. Many citizens who are at risk are not contacted directly because they are not included in the directly contacted vulnerable group (PBL, 2015). This research contributes to improving the communication with the group of 'normal' citizens about heat stress, which can result in better health and well-being of the citizens. It is important to analyse whether these 'normal' citizens know what heat stress measures are and which can help them and their environment to reduce heat stress. Reducing heat stress improves the health of the citizens (PBL, 2015).

Scientific relevance

This research contains mixed methods, which is explained later in the chapter methodology. The advantage of mixed methods is that multiple perspectives are being evaluated and all available tools are used to answer the research question. This helps with integrating the data that is found. By using inductive and deductive arguments using quantitative and qualitative methods, the data results can grow scientifically (Tashakkori et al., 2015). By doing this in this research, the data results that are gathered about heat stress in terms of the implementation and awareness of the citizens are combined to give a broader holistic approach to the subject not seen in other research before about heat stress in Utrecht. This research can contribute on an academic level by focusing on this holistic approach. The framework of Kabisch et al. is adapted and creates a new and more practical way of evaluating the heatplan policy. The heatplan has not been evaluated before with the help of this framework.

2. Literature review

2.1. Climate change

For many years now climate change has been a subject that is often discussed. With increasing scientific research on how climate change develops, the concept is accepted as a reality (Adger, 1999). Climate change is a phenomenon that includes all changes in the climate that are developing over time. Human actions can result in changes to the climate of the Earth directly and indirectly. Direct changes in human actions, for example, deforestation in the Amazon influence biodiversity. Indirect changes as in human actions, for example, industrial activities are influencing the composition of the atmosphere worldwide. Indirect changes can be a bit prompted. Changes in the atmosphere develop because of the increase of greenhouse gases and aerosols which influence solar radiation. Which therefore results in changes in the characteristics on the surface of the Earth. The changes disrupt the climate system (IPCC, 2007b).

Climate change results in an increase in the number of catastrophic events, which is why it is such an urgent issue for humankind. One of the most known effects of climate change is the rising global temperature, which results in the sea level rising and more extreme weather conditions (IPCC, 2021). Extreme weather conditions, for example, heat waves, droughts, storms, floods, and more will appear more often. These become more frequent and cause more damage and calamities. The damages and calamities will increase in impact. Which together with the event itself will make it more difficult to live on Earth for humankind (Schellnhuber et al., 2006). The event itself can result in risks to the health of humans, for example, heat stress (Runhaar et al., 2012). Because of these effects and risks that are developing humankind is obliged to adapt and try to limit climate change (Adger, 1999).

2.2. Climate adaptation

Climate change is increasing and even with the mitigation actions humanity is developing the earth will increase in temperature. Climate adaptation, therefore, becomes unavoidable by about 2100 (Berrang-Ford et al., 2011). This is why climate adaptation has gotten more and more attention in the science and policy sectors. Climate adaptation is an adjustment in ecological, social, or economic systems which is a reaction to present or future climate change effects and impacts. Climate adaptation is seen as an important factor in reducing the impact and dangers climate change causes and dealing with its effects for the next few years. Developing climate change in advance has been seen as an optimal response to climate change because it is the least expensive option. The capacity of climate adaptation is defined as the ability of a country, system, community, city, or region to adapt to climate change and its effects and impacts. These adaptations are mostly about adjustments for average potential damages, not extreme events (de Bruin et al., 2009). However, the report of the Intergovernmental Panel on Climate Change (IPCC) defines climate adaptation capacity as not only the ability to adapt to average events but also to extreme events. Furthermore, the report states that the climate adaptation capacity is about taking advantage of opportunities and coping with the consequences of the adaptation (IPCC, 2007a).

2.3. Heat stress

Due to climate change, there is an increase in global temperatures (IPCC, 2021). This results in heat waves, urban heat stress, and an increase in the effects of urban heat islands and heat

stress on the human body (Arif Widodo & Chandrasiri, 2020). Therefore, high temperatures can negatively influence the quality of life and the environment (Wavin, 2019).

A heat wave is a period when the temperature is over the ninetieth percentile of the monthly division for a minimum of two days. When a heat wave occurs, this percentage can increase in cities all over the world. In Paris and London for example, there were high impacts observed during the heat wave in 2003. The impact of a heat wave that is more than four days is 1.5 to 5 times higher than when a heat wave is shorter (World Health Organisation, 2008).

Therefore, during hot periods and heat waves, cities are significantly warmer than the countryside. Especially at night when it should be cooling off, because, during the day, the heat gets stuck in the city (Wavin, 2019). This is because there is no room for the heat to leave the city. This phenomenon in the city is called urban heat stress (Argüeso et al., 2015). Not every part of the city has a high density, therefore not every part of the city experiences the same amount of heat stress, which results in urban heat islands (UHI) (Heusinkveld et al., 2010). With increasing global temperature, the effects of urban heat islands increase and so does the impact of heat stress on the human body (Arif Widodo & Chandrasiri, 2020). Heat stress is defined as a physical reaction of the human body to thermal stress which is caused by air temperature, wind speed, moisture, and radiation on human physiology (Di Napoli et al., 2019). Therefore, extremely hot weather is resulting in bad conditions for the physical health of the human body for example, illnesses and deaths (World Health Organisation, 2008). The effects of heat waves are underestimated and increase the risks of heat stress in the human body (United Nations University, 2018). Vulnerable groups of citizens in extreme heat are babies, citizens with illnesses and elderly people. Extreme heat has furthermore an impact on citizens who work outside and who must adjust their working hours to prevent health issues (Gun, 2019; Arif Widodo & Chandrasiri, 2020). Therefore, heat stress can cause health issues, for example, illnesses and death. However, it can cause humans to find it harder to concentrate, get headaches faster and are more likely to get tired or dizzy. Hot nights furthermore often make it harder for people to sleep, making them less alert, reducing work productivity and even making people aggressive. Therefore, heat stress can come in mild and severe forms (Kennisportaal Klimaatadaptatie, z.d.).

Heat stress in the Netherlands

Furthermore, in the Netherlands urban heat islands occur which results in increasing effects of heat stress (Klok et al., 2010). Regarding the relationship between daily deaths and daily temperature in the Netherlands, it appears to be in a V-shape. The optimum temperature in the Netherlands is 16,5°C where deaths will increase with higher and lower temperatures. Hot weather worsens air pollution which synergistically acts with heat stress, which increases the mortality of each factor by itself (Runhaar et al., 2012).

Heat stress is not perceived as an urgent issue, because it is not clear who the problem owner is (Runhaar et al., 2012). Municipalities are responsible for rain and sewage water management and river flooding which results in that increased flood risk being more often perceived as an urgent issue.

2.4. Adaptation policy and instruments

Climate adaptation is the process of amendments to present or future impacts of climate change. The process requires commitment from public and private actors. However, governments play a big role in the process of developing and implementing the policy about climate adaptation. Policy about climate adaptation will not operate on its own but is required to be installed in other policies nevertheless (Henstra, 2016). Climate adaptation policy is

different from other policies, because of the highly specific context. This is needed because climate change has different impacts in different countries and areas. Countries and areas are different in vulnerability and the ability to adapt, which results in climate adaptation policies that must be implemented specifically. They should be implemented specifically at the national, regional, and local levels. The development of this, coordination between different levels of decision-making is needed (Glaas & Juhola, 2013).

There are different phases when making climate adaptation policies. First, there is creating a foundation for adaptation where it is necessary to ensure political commitment and resources. Information should be prepared and communicated and collaborations with colleagues and stakeholders should be developed. The difficulty here is that the problem must be recognised as important by political authorities which is often not happening because of a lack of awareness, other priorities, and vague values. Next, there is the second phase namely identifying risks and finding solutions. Here it is important to include all uncertainties and identify the present and future effects of the climate change issue. Inform, specify, and prioritise the potential adaptation instruments and develop the adaptation more by creating new instruments and developing strategies. The difficulty here is a lack of expertise, conflicting values and interests and not being satisfied with measures. Lastly, there is the third phase which is implementing and monitoring actions. Here it is important to initiate, monitor, evaluate and support the implementation process. It is about communicating the adaptation. The difficulty here is that strategies often are not realistic, unavailable solutions, resistance in legal frameworks, results that are too complex to evaluate and a lack of experience in monitoring (Prutsch et al., 2014).

Choosing a policy instrument for climate adaptation is rather political than technical because certain instruments will positively affect certain interests. Policy instruments differ from each other and impact various dimensions which results in regulating multiple sorts of policy instruments. They can be compared and evaluated by four different criteria which can give guidance to decision-makers and increase the information about the political nature of the instruments. The first criterion is the intensity of the resources described in terms of costs. The second criterion is the target described in terms of how well the instruments are focused on benefits and costs. The third criterion is the political risks described in terms of the public image and influences on potential voters. The last criterion is the limits of the government described in terms of ideological and financial limits. These criteria will enhance the technical viability, political acceptance, and economic feasibility of instruments. They improve the sensitivity to the behavioural motivations of populations and include political and economic effects beforehand to recommend the instruments to decision-makers. They improve the amount of information on potential effects and avoid negative policy interplay. Making the instruments more cohesive will improve the abundance of the adaptation policy (Henstra, 2016).

There are five sorts of policy instruments (Baldwin et al., 2011; Prutsch et al., 2014). The first policy instrument is legal instruments, for example, laws, regulations, directives, and decrees. These instruments have an instant effect, are strong and achieve effective objectives. However, they are unpopular, high at risk on the political side, inflexible in achieving objectives, too complex and expensive and require monitoring. Legal instruments are ideal for ensuring a minimum standard of emergencies (Baldwin et al., 2011; Prutsch et al., 2014). Second, there are economic instruments, for example, taxes, fees, tax incentives, subsidies, interest-free loans, and public tenders. These instruments aim to control behaviour rather than give orders. They use mechanisms to their advantage. However, these instruments are moreover unpopular and expensive, and success is not guaranteed because behaviour can change. Economic instruments are ideal to increase innovation and create

niche markets and are a good alternative to legal instruments (Baldwin et al., 2011; Prutsch et al., 2014). Third, there are informative instruments, which are, for example, research, brochures, the Internet, campaigns, and events. These do not have political problems and increase awareness and individual responsibility. However, these instruments have indirect, often weak, and uncertain effects. Informative instruments are ideal for new problems and increasing awareness (Baldwin et al., 2011; Prutsch et al., 2014). Fourth there are partnership instruments, for example, voluntary agreements, partnerships, or collaboration projects. These do not have any political problems, combine resources of stakeholders, and have a cost-effective on the public sector. However, the process of these instruments is complex with success and effects uncertain. Partnership instruments are ideal for problems that one stakeholder alone cannot solve or when there are too few resources. Lastly, there are hybrid, planning or strategic instruments, for example, plans, strategies, action plans and programmes. These instruments have a holistic perspective, foresee overviews, and combine instruments which increase strengths and decrease weaknesses. However, they are often difficult to implement and need the collaboration of several stakeholders. Hybrid, planning, or strategic instruments are ideal for systematic approaches to problems and solutions (Baldwin et al., 2011; Prutsch et al., 2014).

Therefore, for different climate adaptations, there are different instruments needed with different measures. Some measures protect people, for example, improving communication and coordination of aid agencies. These are based on what to do when there are already consequences of the problem. Some measures adapt to spatial areas, for example, increasing green spaces or roof greening. These are about preventing the need for extra protection (Prutsch et al., 2014).

Adaptation policies and instruments in the Netherlands

In the Netherlands, there is a gap regarding adaptation policies and instruments between scientists and planners. There is a gap between the perceived urgency of proactive adaptation that the scientists have about climate adaptation and the perceived perceptions that planners have (Runhaar et al., 2012). It is needed that climate science research enhances their contribution to urban planning. This is by accommodating conceivable theories about the impact climate change will have and by developing adaptation measures that will positively influence several purposes and strategies to achieve successful implementation (Runhaar et al., 2012).

2.5. Adaptation policies and instruments about heat stress in the Netherlands

In the Netherlands, the municipalities have an insufficient understanding of the importance of the impacts of climate change regarding rising heat levels. This causes a problem in developing a necessary good climate adaptation action plan. They do not take sufficient practical steps to manage the risks of heat stress. The municipalities struggle with determining the urgency of heat stress. Furthermore, cannot find good arguments to develop climate adaptation policies to adapt urban areas to rising global temperatures (Klok & Kluck, 2018). However, heat maps are developed to show the need for climate adaptation in certain urban areas and try to increase actions when it to heat adaptation (Klok & Kluck, 2018; Klimaatadaptatie Nederland, z.d.).

All stakeholders who develop climate adaptation for example, urban planners, landscape architects, project developers, water managers and other professionals at municipalities often do not know what to do regarding heat. They often do not know what requirements to set for new heat-resistant designs of the city, neighbourhoods, and streets. They do not understand the desired results and which measures are needed to become heat

resilient (Kluck et al., 2020). This is why new climate adaptation policies are being developed. For example, the climate scenarios and adaptation policy from the central government or the heat policy from municipalities and provinces (Kluck et al., 2020; Gemeente Utrecht, 2022).

2.6. Heat stress measures in the Netherlands

Regarding heat stress measures the Netherlands chose to focus on achieving two goals. The first goal is to keep the average temperatures during heat periods in the city as low as possible. This is best achieved by creating more evaporation. The other goal is to limit the heat during the day and to keep the city liveable by creating enough cool places. Here the apparent temperature PET is used as an indicator for this (Kluck et al., 2020). Namely, in the shade, the perceived temperature must be 10-15°C lower than in the sun. Creating shade is therefore the most effective way to lower the wind chill (Kluck et al., 2020).

There are three useful and verifiable design measures. First, there should be a minimum distance to coolness. Every home should be sufficiently close to a pleasant and attractive cool place to stay within three hundred meters. Second, there should be a minimum percentage of shade on major pedestrian routes and in neighbourhoods. There should be sufficient shade during the hottest part of the day at least forty per cent on major pedestrian routes because those essential functions remain accessible to everyone in the city (Kluck et al., 2020). There should be sufficient shade in walking areas in neighbourhoods during the hottest part of the day. At least thirty per cent because then the neighbourhoods remain attractive. Lastly, there should be a minimum percentage of greenery per neighbourhood. There must be many greeneries where evaporation can occur, and the average air temperature is limited, depending on the type of neighbourhood. These measures are not vague, however controllable, and feasible, which will help the professionals who work in a municipality to use the measures when developing plans (Kluck et al., 2020).

2.6.1. Case study Utrecht

This research focuses on the city of Utrecht and how the municipality handles the climate change effect on heat stress. In this section, the specifics of the city are explained as what has been done so far about heat stress.

The Netherlands is a country with a low level in comparison with the sea level and is located on a delta. The country has been fighting the North Sea for over two thousand years now. Which resulted in maintaining and reclaiming their land. Therefore, with all these disadvantages the Netherlands is extremely vulnerable to the effects of climate change now and in the future. Regarding heat stress, heat waves, droughts and wildfires will increase which will have a serious impact on the ecosystem in the Netherlands and the health and liveability of citizens and animals. Especially regarding heat, vulnerable citizens will experience the most impact (Masson-Delmotte et al., 2021).

The University of Utrecht focuses on sustainability and wants to make the transition to a sustainable society. They want to contribute by teaching, researching, and developing about and in sustainability (McDevitt, 2022). In earlier research from McDevitt (2022), risk maps have been made of a certain area in Utrecht and what kind of exposure that area will have to heat stress. The area of the University of Utrecht is at present being redeveloped, which contributes even more to the opportunity to develop this area as climate-resilience as possible.

The municipality of Utrecht takes measures against climate change, where a policy is developed and specific about energy transition (Gemeente Utrecht, z.d.). However, this section focuses on heat stress in Utrecht because that is the focus of the research.

Regarding what the municipality communicates about heat stress, they have a different section on their website appointed to heat (Gemeente Utrecht, z.d.). On this website, they explain what heat does to our health which can contribute to more citizens going to the hospital and pets being overheated. Which in both cases sometimes leads to deaths. They furthermore explain why it is occurring and how to handle it better with our pets. Especially the areas in Utrecht with many stones, concrete, asphalt, and not many green areas are most vulnerable to an increase in heat in comparison to the areas near water. At night these hot areas for example, industrial areas, the city centre, Rivierenwijk, Ondiep and Zuilen with many stones do not cool down enough, which enhances the problem.

So far, the municipality of Utrecht provided a few services to find cooling. Such as tap water taps, splash pools, recreational swimming, and nature areas with bathing water. The municipality explains the importance of green areas in the city furthermore around the house, which helps with cooling down in hot temperatures because then trees and plants release moisture into the air. They name greening their roof, facade, and street, where the municipality can subsidize. The citizens of Utrecht can contribute to doing research regarding climate change, with the initiative *Measure your city* (Gemeente Utrecht, z.d.).

Therefore, the municipality of Utrecht already provided a few services to find cooling as earlier mentioned. However, they are keen on greening the city to provide more cooling. The goal is to not have a difference in temperatures of more than five degrees in and outside the city. They want to ensure that every citizen can walk in the shadow of trees and that they live within two hundred meters of a cooling, greening area which is at least two hundred square meters (Gemeente Utrecht, z.d.).

Communicating heat stress measures for citizens

The municipality of Utrecht created a heatplan (Gemeente Utrecht, 2022). The heatplan is a protocol for local actions to reduce heat stress impacts on the citizens of Utrecht. The vulnerable citizens, such as the homeless, elderly, and chronically sick, are important in this plan. Furthermore, having pets and farm animals play an important role. The heatplan is a further developed part of the *Vision Climate adaptation Utrecht* and is an addition towards the Law of Public Health. The goal of the communication of heat stress impacts is to decrease the chance that vulnerable citizens die prematurely. Individual caretakers and healthcare organisations play a big part in this. Through a network of contact, they provide vulnerable citizens directly with information about hot periods and heat waves and their impacts, which enhances the preparation to deal with the heat. Furthermore, companies that hold animals are being informed. As for the ‘normal’ citizens, they only communicate indirectly through social media and sometimes newsletters about what kind of cooling services there are in the city and what they can do on their own against heat and to help vulnerable citizens and animals. After every summer, stakeholders are involved in analysing how the communication about heat stress impacts went, how they functioned and which improvements could be made. The heatplan, therefore, is a growth model (Gemeente Utrecht, 2022).

The municipality has developed heat maps, where the citizens can see what the temperature in their neighbourhood will be, what the difference is in and outside the city, how far the citizens would have to walk for cooling areas and which places have enough or to less shadow (Gemeente Utrecht, z.d.).

The Heatplan

The heatplan of the municipality of Utrecht (Gemeente Utrecht, 2022) is an informative instrument. The heatplan promotes awareness of heat stress and individual responsibility. However, the effects of the heatplan are uncertain when not analysing and monitoring the plan (Gemeente Utrecht, 2022).

The heatplan (Gemeente Utrecht, 2022) contains measures to protect citizens by improving communication and coordination about heat stress. For example, measures communicating about heat stress with healthcare institutions and childcare locations or communicating about heat stress with vulnerable and non-self-reliant people living at home. The communication is based on what to do when there are already consequences of the problem, namely hot periods, and heat waves (Gemeente Utrecht, 2022).

3. Theoretical framework

3.1. Nature-based solutions

There are multiple approaches to climate adaptation (McDevitt, 2022). For example, informative measures aimed at raising awareness, green measures for example, river renaturation, and grey measures such as technical slope stabilization or thermal insulation of buildings (Prutsch et al., 2014). Furthermore, one of these approaches is nature-based solutions. Nature-based solutions have taken centre stage as a manner to deal with societal challenges by acting innovative inspired or supported by nature (Calliari et al., 2019). The concept of nature-based solutions is about natural solutions for handling multiple urban sustainability challenges and problems. Nature-based solutions are a promising and innovative approach to dealing with the challenges and problems a city can face (Dorst et al., 2022). Nature-based solutions can be used for all kinds of problems and challenges when it comes to climate adaptation. For example, to reduce the effects of urban heat stress, by implementing green and blue spaces (Augusto et al., 2020).

Aligning nature-based solutions sometimes leads to a positive influence on implementing nature-based solutions in urban areas. For example, the ‘Green Deal Green Roofs’ partnership which was facilitated by the Dutch government, was a reaction of aligning nature-based solutions with the priority of responding to climate change. This plan of creating green roofs across the city was supported by several actors and actions, for example, in Utrecht (Tozer et al., 2022).

Barriers

Nature-based solutions are not fully integrated into normal urban development yet. Seven key barriers to urban nature-based solutions are shaped by structural conditions in urban municipalities (Dorst et al., 2022). The seven barriers are limited collaborative governance; knowledge, data, and awareness challenges; low private sector engagement; competition over urban space; insufficient policy development, implementation, and enforcement; insufficient public resources; and challenging citizen engagement (Dorst et al., 2022). In the Netherlands for example, it was observed that there was uncertainty and a lack of capacity within local governments to take the lead in sustainability innovations. The main barrier observed in the Netherlands is a gap between policy design and implementation. Structural conditions underpinning this barrier, include policy silos and a lack of coherence in urban greening goals (Dorst et al., 2022).

3.2. Frameworks effectiveness policies

There are many frameworks to analyse policies (Yorke et al., 2016; Cooksy et al., 2001; Crabb & Leroy, 2012; Liefferink, 2006). For example, the policy trajectory framework comprises the realms of influencing factors, policy text generation, implementation practices and their effects, as well as lasting impacts over time (Yorke et al., 2016). Furthermore, the program logic model acts as an integrative framework for the analysis of policy, showcased in a multimethod evaluation. It focuses data collection efforts on relevant activities and outcomes, organizes the data, and facilitates interpretation from various methods and sources within a unified framework (Cooksy et al., 2001). Furthermore, the comprehensive toolkit of evaluation methods and techniques framework. Such as goal-free evaluations, impact assessments, and case-study evaluations, among others. These approaches involve stakeholder engagement, navigating sensitivities between them, conducting a priori assessments of evaluability within a field, and maximizing the utilization of evaluation outcomes (Crabb & Leroy, 2012). Furthermore, the policy arrangement framework

effectively incorporates both institutional and discourse analyses, as well as structural and agency-oriented perspectives (Lieberink, 2006).

However, there are multiple frameworks to analyse the policies of nature-based solutions. For example, the framework of Calliari et al. (2019) is about developing climate-proof nature-based solutions. This framework includes the cooperation of system analyses and the vision-back casting approach. The vision phase of the framework is about defining the shared vision of the future by analysing the phenomenon that should be changed. This is done by wanting to achieve the main objective and sub-objectives and identifying factors that are linked, external, enabling and constraining (Calliari et al., 2019). The back-casting phase is about collecting the actions that are needed to achieve the vision. It includes identifying climate-proof possible alternatives and developing all direct and indirect benefits and costs that come with each different alternative. The next phase is about quantifying and comparing the benefits and costs which can lead to choosing the best alternative. When chosen, the alternative is implemented and managed (Calliari et al., 2019).

Another framework for analysing nature-based solutions is that of Raymond et al. (2017). This framework focuses on analysing the co-benefits of nature-based solutions. It presents a comprehensive framework for evaluating the co-benefits and costs of nature-based solutions across various elements of socio-cultural and socio-economic systems, biodiversity, ecosystems, and climate and physical environment. This framework was developed through a review of more than seventeen thousand documents encompassing both scientific literature and practical applications, addressing ten societal challenges relevant to cities worldwide (Raymond et al., 2017). These societal challenges are climate mitigation and adaptation, water management, coastal resilience, green space management, air quality, urban regeneration, participatory planning and governance, social justice and social cohesion, public health and well-being, and green economic and jobs. Within the four elements and ten societal challenges, co-production can come across ecosystem services with direct and indirect drivers of change. This framework, along with the seven-stage co-benefit assessment process, serves as a valuable tool for guiding decision-making and recognizing the multifaceted benefits of nature-based solutions implementation (Raymond et al., 2017).

This thesis does not focus on these frameworks, because the heatplan of the municipality of Utrecht (Gemeente Utrecht, 2022) and the main research question of this thesis include citizens' involvement, which is not or not enough included in these frameworks.

3.2.1. Framework effectiveness environmental assessments

The following framework used in a study by Baker and McLelland (2003) focuses on the effectiveness of policies in specific environmental assessments which is shown in Figure 1. This framework was developed by Sadler (1996).

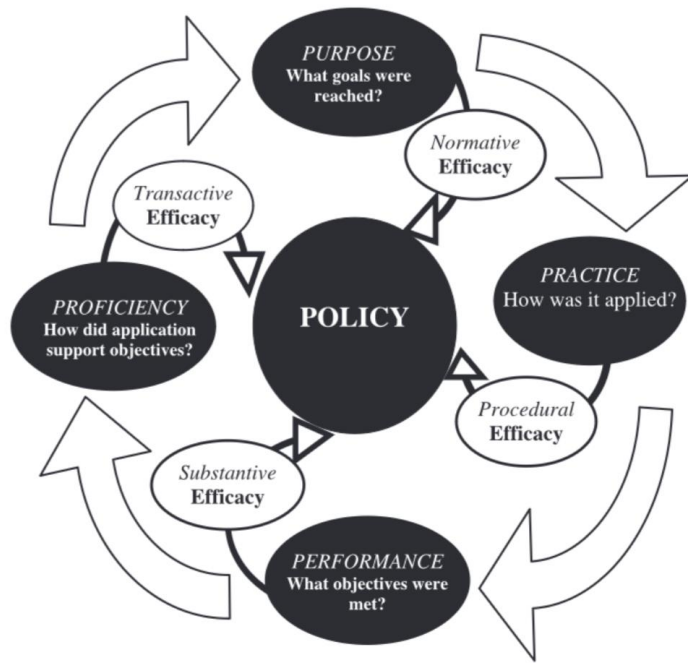


Figure 1. Framework effectiveness policy

The "Effectiveness Triangle" (Sadler, 1996) is meant to determine the effectiveness of environmental assessment policies at a component-specific level. The expanded framework consists of procedural, substantive, transactive, and normative aspects of efficacy.

The circular effectiveness cycle represented in the framework focuses on practice, performance, proficiency, and purpose, with their respective efficacy measurements linked to policy. The extent to which the policy works in all four aspects determines its overall effectiveness. The framework begins with the practice of the policy and proceeds in a clockwise direction (Baker & McLelland, 2003). The practice component of the framework involves examining how the policy was applied and whether it adhered to accepted procedural principles. This examination provides a measure of procedural efficacy, and adjustments are made to the policy to improve its future applications (Baker & McLelland, 2003). The performance component of the framework involves finding out what objectives were met because of the policy's application. The comparison of achieved objectives to established objectives provides a measure of substantive efficacy, and adjustments are made to the policy to improve future objective achievement (Baker & McLelland, 2003). The proficiency component of the framework involves finding out how resources were used in achieving objectives. Transactive efficacy measures the extent to which the least cost was incurred, and the minimal amount of time used in achieving objectives. Adjustments to the policy are made to improve its proficiency in future applications. The purpose component of the framework involves finding out what normative goals are realized by the policy. Normative efficacy measures the extent to which these goals are achieved, and adjustments to the policy are made to improve its future normative goal realization (Baker & McLelland, 2003). Overall policy effectiveness is determined by the extent to which the policy works from the standpoint of practice, performance, proficiency, and purpose. If the policy works well in all four aspects, it has overall effectiveness. If it fails to work in any of these aspects, it does not have overall effectiveness (Baker & McLelland, 2003).

This is an informative framework about the effectiveness of policies on environmental assessments, not on nature-based solutions. Therefore, this thesis does not focus on this

framework, because the heatplan of the municipality of Utrecht (Gemeente Utrecht, 2022) and the main research question of this thesis include nature-based solutions.

3.2.2. Framework effectiveness NBS

The report of the European Commission about nature-based solutions and increasing nature in the cities increased the need for research and innovation about the effectiveness of these solutions (Sowińska-Świerkosz & García, 2021). In response, Kabisch et al. (2016) created a framework to analyse which indicators to analyse the effectiveness of nature-based solutions to climate change mitigation and adaptation in urban areas. This framework is used in this research which can be seen in Figure 2.

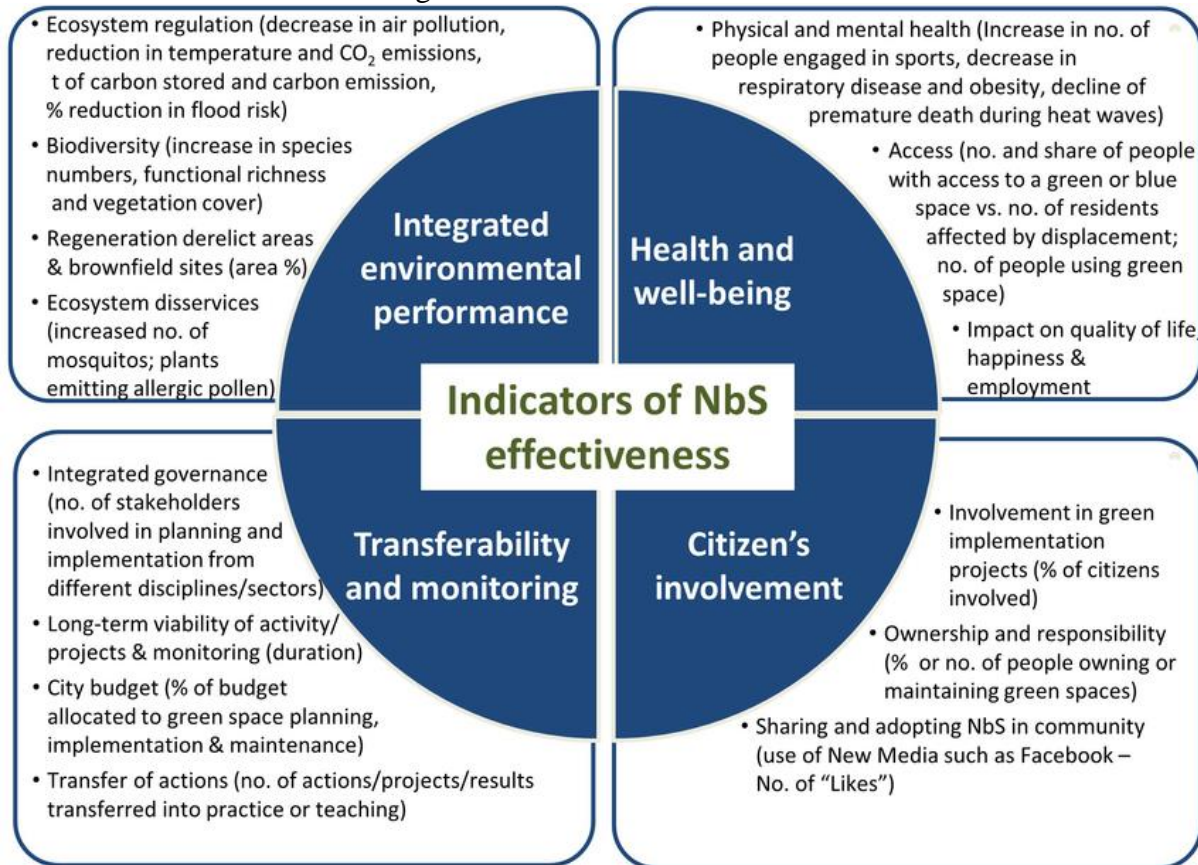


Figure 2. Indicators effectiveness NBS

Developing the specifics of the indicators of nature-based solutions is seen as fundamental. An indicator is defined as a measure that is based on verifiable data that will decrease the complexity and entails information (Haase et al., 2014). The indicators can measure, analyse, monitor, and communicate efficiently the effectiveness and characteristics of nature-based solutions (Sparks et al., 2011). Regarding communication, indicators can help in evaluating what kind of benefits there are to a certain climate adaptation and therefore benefit human health. The values of indicators can contribute to developing decisions about policymaking by providing arguments, for example, nature-based solutions. Many indicators were identified through an expert workshop in the study of Kabisch et al. (2016). Which can be found in Figure 2. The indicators that were identified are focused on nature-based solutions at the city level and between cities. More indicators are discussed in other literature (Colls et al., 2009; Cowan et al., 2010; Doswald & Osti, 2011) however the indicators in Figure 2 are said to be sufficient in covering four crucial indicators when assessing the effectiveness of nature-based solutions. The first indicator is about integrating environmental performance, then

indicators about human health and well-being, next indicators about the involvement of citizens and lastly indicators about the transferability of the nature-based solution.

What special is about this framework, is that there is a supply side related to urban ecosystem services, for example, the indicators that are about environmental performance. There is a demand side where socio-demographic and socio-economic data is needed in the assessment, for example, the indicators that are about health and well-being, citizens' involvement, transferability, and monitoring (Kabisch et al., 2016).

Integrated environmental performance

The indicators of integrating environmental performance relate to regulating urban ecosystem services. For example, measuring climate regulation in temperature reduction. Some of the indicators are about biodiversity, for example, what kind of vegetation there is in a certain area with can provide for biodiversity (Beninde et al., 2015). Furthermore, indicators about increasing urban green spaces and transforming brownfield areas into one are included. Furthermore, indicators related to ecosystem disservices, for example, green and blue infrastructure and the number of mosquitoes or plants emitting allergic pollen. Ecosystem disservices have mainly a negative influence on human well-being (Lyytimäki & Sipilä, 2009). When judging these urban ecosystem services, it is noticed that especially indicators are used for local climate regulation and not for cultural and providing services because of the lack of available data (Haase et al., 2014).

Health and well-being

The indicators of health and well-being relate to physical and mental health and towards the spatial availability of green and blue spaces. The physical and mental health indicators measure the number of people that participate in outdoor sports activities and health benefits, for example, reducing diseases or obesity. An indicator that influences mental health is the level of happiness which can be measured by the level of satisfaction (Carrus et al., 2013). Many studies have shown that living close to green spaces has a positive influence on health (Harti et al., 2014), which therefore relates to the indicator access. Within the indicator access, there are social and environmental justice issues related. For example, the number of available green spaces is related to the number of citizens and the number of citizens who are exposed to displacement or segregation. The increase in green spaces can lead to an increase in land prices because of the increase in attractiveness. Which results in citizens that cannot profit because of displacement processes and is called the green paradox (Wolch et al., 2014), eco-gentrification (Irvine et al., 2013; Haffner, 2015), ecological gentrification (Dooling, 2009) or environmental gentrification (Checker, 2011). Another indicator is the impact, which entails the quality of life, happiness, and employment (Kabisch et al., 2016).

Citizens' involvement

Indicators relating to citizens' involvement can be measured by, for example, the involvement of citizens in developing green spaces and by the green spaces that citizens own or maintain themselves (Shandas & Messer, 2008). Furthermore, indicators that measure on what basis information about the nature-based solutions are shared and adopted, are included. For example, focus on the information that is gained through media, such as the number of likes on a Facebook post (Kabisch et al., 2016).

Transferability and monitoring

At last, the fourth set of indicators relates to the transferability and monitoring of the nature-based solution. They relate to transferring model projects into practice and then monitoring them. Indicators about measuring the implementation and approaching integrated governance, are included. These are measured by the number of stakeholders that are

involved from different sectors that are involved in planning and implementation. Furthermore, the number of policymakers that implement nature-based solutions in their planning agendas, policy plans and discourses. Further, indicators about long-term viability were included. For example, timing, financial aspects, and monitoring, which means whether monitoring is encouraged and the duration of the monitoring activities. Next, there are indicators about the city budget. These relate to the percentage of the budget that is assigned to green space planning, implementation, maintenance, and monitoring. Lastly, there are indicators about the transfer of actions, which is measured by the number of actions, projects and results that are transferred into practice (Kabisch et al., 2016).

In this research, the focus is on the framework of Kabisch et al. (2016). This framework is chosen because of the focus of the research. The framework of Kabisch et al. (2016) is more focused on citizen involvement and nature-based solutions than the framework of Baker and McLelland (2003) focuses on, or the other frameworks described (Yorke et al., 2016; Cooksy et al., 2001; Crabb & Leroy, 2012; Liefferink, 2006; Calliari et al., 2019; Raymond et al., 2017). The framework of Kabisch et al. (2016) therefore helps answer the research question better because of the citizens' involvement and nature-based solutions focus, which is included in the heatplan of the municipality of Utrecht (Gemeente Utrecht, 2022), the policy that is the focus of this research.

3.3. Conceptual framework and model

For this research, the framework of Kabisch et al. (2016) is adapted to answer the research questions. The indicators that are included in analysing the effectiveness of the nature-based solutions are on the demand side of the framework. This means that socio-demographic and socio-economic data are needed in the assessment, which are the set of indicators that are about health and well-being, citizens' involvement and transferability and monitoring. This means that the set of indicators about the integrated environmental performance is not included because those indicators are too detailed about the measures themselves rather than the communication of the measures. Meaning that the main research question is focused on how the communication of the nature-based solutions is going which is described in the heatplan and not an analysis of the solutions themselves. This would make the research too broad.

The set of indicators that are about health and well-being include the awareness of the heatplan. Without being aware of the heatplan it cannot contribute to the health and well-being of the citizens. This set of indicators as well as those about citizens' involvement are analysed with help from the surveys. The surveys focus on how well the citizens are involved in the implementation of the heatplan in percentage and therefore contribute to gaining information on that specific indicator. The expert interviews give answers to the set of indicators about transferability and monitoring. These analyses of the indicators of the framework result in the conceptual framework and conceptual model of this research which is seen in Figure 3.

Regarding the research of Wendling et al. (2018) who implemented the framework of Kabisch et al. (2016), the indicators in that study have been graded between zero (not effective) to ten (effective). In this research, the indicators are graded, from one (not effective) to five (effective). The shorter range is chosen because the ranking of the effectiveness of the heatplan this way is easier and because it aligns with the number of question-answer categories. This ranking is done by asking questions about the indicators in the expert interviews and surveys which result in data that give a conclusion about how the

indicators influence the effectiveness of the heatplan and how the effectiveness of the heatplan is ranked. The effectiveness of the heatplan is analysed through the indicator groups of Health and Well-being, Transferability and Monitoring and Citizens' involvement.

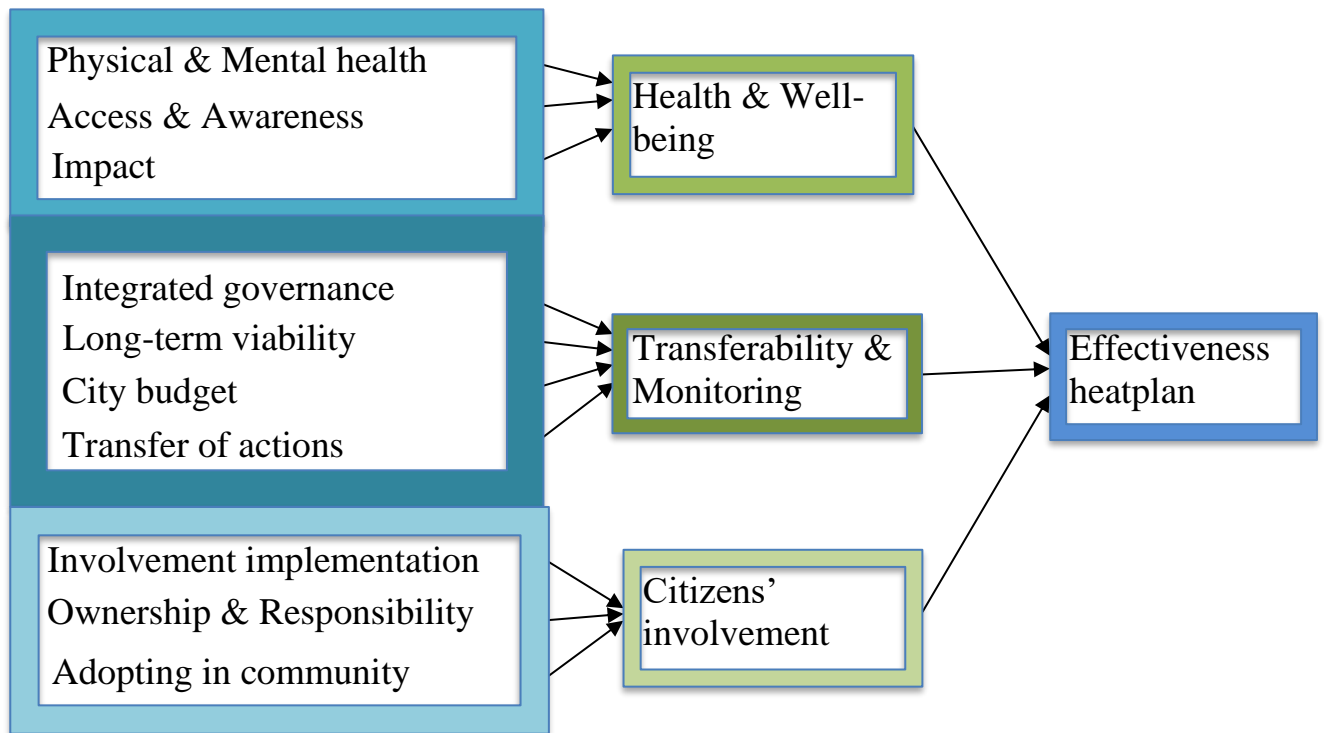


Figure 3. Conceptual model

Regarding the indicators of Health and Well-being, the following questions and focus are applied to the surveys. The physical and mental health indicators are measured by questions that focus on participating in outdoor activities and whether the respondents are satisfied or not on a scale from one to five. The indicators of access and awareness are measured by a question about whether the respondents have access to green spaces more than one kilometre away, one kilometre or less, seven hundred and fifty meters or less, five hundred meters or less or within two hundred meters. The fewer meters towards a green space, the more access they have to a place where they can cool off. A question about awareness is included whether the respondents are aware of the heat stress problems and consequences on a scale of one to five. The last indicator impact is measured by a question about how on a scale of one to five heat stress is impacting their quality of life, work, and happiness. The answers to these questions help answer the main research question.

Looking into the indicators of Transferability and Monitoring, the following questions and focus are applied to the expert interviews. Integrated governance is measured by questions about the number of stakeholders from different sectors that are involved in planning and implementation and the number of policymakers that implement the heatplan measures in their planning agendas, policy plans and discourses. Furthermore, are the sub-questions answered here by questions about the implementation how the municipality of Utrecht is implementing the heatplan, what kind of obstacles the municipality of Utrecht is experiencing during the implementation of the heatplan and to what extent the municipality of Utrecht is communicating the measures of the heatplan with the citizens in specific the 'normal' citizens. Long-term viability is measured by questions about what the timing, financial aspects and monitoring contexts are to the heatplan. Therefore, the city budget is measured through a question about the percentage of the budget assigned to green space planning, implementation, maintenance, and monitoring. The transfer of actions indicator is

measured by the number of actions, projects and results that are transferred into practice. The answers to these questions in the expert interviews help answer the sub-research questions.

When talking about the indicators of the Citizens' involvement the following questions and focus are applied to the survey. The implementation involvement is measured through questions about whether they know what to do against heat stress, for example, finding cooling spaces and knowing how they can help vulnerable residents and animals on a scale of one to five. Ownership and responsibility are measured by questions about whether the respondents are using the heat stress measures mentioned in the heatplan about where to find cooling spaces and are helping vulnerable citizens and animals. The indicator about adopting the heatplan measures in the community is measured by a question about whether the respondents are sharing information about what to do on social media. The answers to these questions help answer the main research question.

3.3.1. Operationalization

For more clarification about how the indicators are measured, see Table 1. below.

Table 1. Measuring indicators

Indicators	Questions in survey	Measures
Physical & Mental health	12. To what extent do you participate in outdoor activities? Think of a round of walking/cycling or doing sports.	1-I do not participate in outdoor activities. 2-I participate in outdoor activities once or twice a week. 3-I participate in outdoor activities three or four times a week. 4-I participate in outdoor activities five or six times a week. 5-I participate in outdoor activities every day.
	13. To what extent are you mentally satisfied?	1-I am very dissatisfied. 2-I am a little mentally dissatisfied. 3-I am neutral. 4-I am quite satisfied. 5-I am very satisfied.
Access & Awareness	14. To what extent do you have access from your home to places where there is cooling (such as a park, square with many trees/water or a forest)?	1-Less than 200 meters. 2-Between 200 and 500 meters. 3-Between 501 meters and 750 meters. 4-Between 751 and 1000 meters. 5-More than 1 km.
	15. To what extent are you aware of the heat stress problems and consequences? Think of problems/consequences such as difficulty with concentrating or sleeping, getting headaches faster, becoming aggressive, tired, or dizzy faster, being less alert or productive, dehydration, overheating, heart failure, possibility of dying earlier, more hospital visits and therefore overloading the healthcare organisations.	1-I am not aware of the problems/consequences of heat stress. 2-I am aware of at least one or two problems/consequences of heat stress. 3-I am aware of at least three or four problems/consequences of heat stress. 4-I am aware of at least five or six problems/consequences of heat stress. 5-I am aware of at least seven problems/consequences of heat stress.
Impact	16. To what extent does the risk of heat stress negatively affect your quality of life, work, and happiness?	1-Heat stress has no impact on my quality of life, work, and happiness. 2-Heat stress has some impact on my quality of life, work, and happiness. 3-Heat stress has enough impact on my quality of life, work, and happiness. 4-Heat stress has more than enough impact on my quality of life, work, and happiness. 5-Heat stress has a lot of impact on my quality of life, work, and happiness.
Involvement implementation	6. To what extent do you know what to do to prevent heat stress in yourself? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding	1-I don't know what I can do to prevent heat stress. 2-I know a little (only one measure) about what I should do to prevent heat stress. 3-I know enough (at least two measures) about what I should do to prevent heat stress.

	cold places and where there are facilities for cooling and so on.	4-I know more than enough (at least three measures) about what I should do to prevent heat stress. 5-I know a lot (at least four measures) about what I should do to prevent heat stress.
	7. To what extent do you know what to do to prevent heat stress among vulnerable people around you and your pets? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.	1-I am not aware of what to do to avoid heat stress in vulnerable persons or pets around me. 2- I am somewhat aware (only one measure) of what to do to prevent heat stress in vulnerable people or pets around me. 3- I am sufficiently aware (at least two measures) of what I must do to prevent heat stress in vulnerable people or pets around me. 4- I am more than sufficiently aware (at least three measures) of what I must do to prevent heat stress in vulnerable people or pets around me. 5- I am very aware (at least four measures) of what I must do to prevent heat stress in vulnerable people or pets around me.
Ownership & Responsibility	8. During the hot periods in the past two years, to what extent did you use the following measures to prevent heat stress: hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.	1-I do not use any measures. 2-I use one measure. 3-I use two measures. 4-I use three measures. 5-I use four or more measures.
	9. To what extent have you consulted vulnerable people around you during a hot period the past two years about what to do to prevent heat stress? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.	1-I don't have vulnerable people around me. 2-I have not consulted vulnerable people around me. 3-I consulted vulnerable people around me about one measure. 4-I consulted vulnerable people around me about two measures. 5-I consulted vulnerable people around me about three measures. 6-I consulted vulnerable people around me about four or more measures.
	10. To what extent have you taken measures for your pet(s) during a hot period the past two years to prevent heat stress? Think of measures such as hydrating, staying in the shade, not doing physically hard work (such as taking long walks), finding cold places and where there are facilities for cooling and so on.	1-I have no pet 2-I did not use the measures for my pet. 3-I used one measure for my pet. 4-I used two measures for my pet. 5-I used three measures for my pet. 6-I used four or more measures for my pet.
Adopting in community	11. To what extent do you share with others on your social media during a hot period the past two years what to do to prevent heat stress? Think of Facebook, Twitter, and Instagram.	1-I do not share anything on social media about measures to prevent heat stress during a hot period. 2-I will share something on social media about measures to prevent heat stress during a hot period. 3- I share twice on social media about measures to prevent heat stress during a hot period. 4-I shared three times on social media about measures to prevent heat stress during a hot period. 5-I share several times on social media about measures to prevent heat stress during a hot period.
	Questions in expert interviews	
Integrated governance	1. In what way is the municipality of Utrecht implementing the heat plan so far? Think for instance about whether the heat plan has already been used and what results came forward.	
	2. In what way is the municipality of Utrecht implementing the heat plan so far? Think for instance about whether the heat plan has already been used and what results came forward.	
	3. To what extent and how does the municipality of Utrecht communicate the measures of the heat plan to citizens who do not fall under the vulnerable group? In the heatplan it is described as through social	

	media channels of the municipality of Utrecht and neighbourhood newsletters, but on communicating with the other target groups there are broader explanations, so that is why I'm curious for more.	
Section 6 of the heat plan describes the division of tasks of five stakeholders regarding the planning and implementation of the heat plan.	4. To what extent do you feel these five stakeholders have been involved in the planning and implementation of the heat plan in 2022? Given the experience of 2022, do you think there is still room for improvement in the way these stakeholders are involved and cooperating in the implementation of the heat plan?	
	5. How is the cooperation from the Municipality of Utrecht with the other four stakeholders (GGD, Red Cross, GHOR and Animal Protection) perceived by the municipality according to you?	
Long-term viability	6. To what extent are the vigilance phase, pre-warning phase and warning phase that result in the timing of the heatplan, perceived sufficient by the municipality according to you?	
	7. What are financial aspects of implementing the heat plan and to what extent do they affect the viability?	
	8. To what extent is the monitoring of the heat plan experienced by the municipality as sufficient according to you? Consider, for example, whether monitoring is also encouraged and how long it takes to monitor the heat plan.	
City budget	9. To what extent is the budget for planning, implementation, maintenance, and monitoring in terms of climate change policy according to you sufficient?	
Transfer of actions	10. To what extent are actions like planning, implementing, maintaining, and monitoring taken place and which ones according to you?	

3.3.2. Effectiveness

Effectiveness is defined as the degree to which something functions as intended and fulfils its designed purposes. Following this notion, several principles have been proposed to guide the effective application. Effectiveness is about respecting uncertainty, establishing clear rules for implementation, evaluating the needs and alternatives, ensuring transparency, openness, and public participation, monitoring outcomes, and mostly striving for efficiency (Baker & McLelland, 2003).

However, analysing the effectiveness of nature-based solutions remains a difficult task to fulfil. One contributing factor to this issue is the absence of a comprehensive synthesis of evidence regarding the effectiveness of nature-based solutions for climate change adaptation policies. The available evidence is dispersed across various disciplines within the physical, natural, and social sciences, making it challenging for policymakers and decision-makers to access and utilize (Chausson et al., 2020). For example, changes in species distribution, habitat fragmentation, biodiversity loss, and increased climate impact may diminish the effectiveness of nature-based solutions and climate adaptation policies. For

example, when there is more deforestation in the city and it is becoming denser because of new buildings, the heat and droughts will increase and therefore influence the heat stress problem (Martin, Costa, Egerer & Schneider, 2021).

However, the goal of the heatplan is to communicate about where citizens can find facilities, what they can do against heat and how they can help vulnerable residents and animals. The definition of effectiveness is the degree to which something functions as intended and fulfils its designed purposes (Baker & McLelland, 2003). Therefore, the effectiveness of the heatplan is the degree to which the heatplan functions and fulfils its goal. In this research, the effectiveness is measured through the expert interviews and the survey and rated by the interviewees (who are among others the creators of the heatplan) and the respondents of the survey (citizens of the municipality of Utrecht). The heatplan is effective when it functions well and if the citizens get information about where facilities are, what to do against heat stress and how to help others. The interviewees and respondents can rate the effectiveness from one to five and can rate how they think the indicators influence it. One is not effective and five is very effective. The heatplan is effective when the goal of the heatplan is succeeded and whether the interviewees and respondents think so. For more clarification about how the effectiveness of the heatplan is measured, see Table 2. below.

Table 2. Measuring effectiveness

Aspects	Questions in survey	Measures
How often informed	17. How often have you been informed about what to do during a hot period to prevent heat stress with yourself, others, and animals the past two years?	1-I have not been informed. 2-I have seen/read one post about this. 3-I have seen/read two posts about this. 4-I have seen/read three posts about this. 5-I have seen/read four or more posts about this.
Messages from municipality of Utrecht	18. How many of these messages came from the Municipality of Utrecht?	1-No messages 2-One message 3-Two messages 4-Three messages 5-Four or more messages
Other informants	19. Who wrote the other messages in which you were informed about what to do during a hot period to prevent heat stress in yourself, others, and animals the past two years? Multiple options are possible.	1-From no one else 2-RIVM 3-GGD Utrecht 4-News channels such as the newspaper/radio 5-Other
Informed enough	20. Do you have the idea that you have been informed enough about what to do during a hot period to prevent heat stress in yourself, others, and animals the past two years?	1-Not at all 2-A little 3-Enough 4-More than enough 5-Very much
Citizen involvement	22. On a scale from one to five (where 1 is the lowest and 5 is the highest), how would you rate your involvement in the heat plan? Think of taking measures against heat stress or informing others.	1-2-3-4-5
Citizen involvement influence on effectiveness	23. On a scale of one to five, how much do you your involvement influences the effectiveness of the heat plan? Here 1 is: Involvement does not influence effectiveness. And 5: Involvement greatly influences effectiveness.	1-2-3-4-5
Health and well-being	24. On a scale of one to five (where 1 is the lowest and 5 is the highest),	1-2-3-4-5

	how would you rate your health and well-being? Think of your overall health and your awareness of the consequences and impact of heat stress on your body.	
Health and well-being influence on effectiveness	25. On a scale of one to five, how much do you think your health and well-being influences the effectiveness of the heat plan? Here is 1: Health and well-being does not influence effectiveness. And 5: Health and well-being greatly influence effectiveness.	1-2-3-4-5
Effectiveness rating	On a scale of one to five (where 1 is the lowest and 5 is the highest), how would you rate the effectiveness of the heat plan?	1-2-3-4-5
Questions in expert interviews		
Transferability	11. On a scale of one to five (increasing), how would you rate the transferability of the heat plan? Transferability meaning how well the heatplan is transferred to reality taking into consideration the obstacles, stakeholder' cooperation, timing, viability, budget, and actions that have been developed. Why did you give this score?	
Transferability influence on effectiveness	12. On a scale of one to five (increasing), how much does transferability affect the effectiveness of the heat plan? Why did you give this score?	
Effectiveness rating	13. On a scale of one to five (increasing), how would you rate the effectiveness of the heat plan? Why did you give this score?	

4. Methodology

4.1. Research strategy

In this research, one case study is implied therefore the focus of this research is on one city, namely the city of Utrecht in the Netherlands. The case in specifics of heat stress in Utrecht is explained in detail in section 2.6.1..

As mentioned before, there are different solutions towards strategies to handle climate change (McDevitt, 2022). However, working with nature to handle climate change has become more and more important as mentioned before. Nature-based solutions have increased and taken centre stage in responding to climate change challenges, where the actions are innovative or supported by nature (Calliari et al., 2019). In this research, the focus is on heat stress measures that are nature-based solutions. To analyse the effectiveness of these nature-based solutions in the city of Utrecht, the framework presented in the research from Kabisch et al. (2016) is used to analyse the first, second and third sub-question on how the municipality is implementing the heat stress measures, what the obstacles are and to what extent the municipality communicates the heat stress measures with the “normal” citizens.

The sub-questions about implementation, obstacles and communication are researched by a qualitative method. Four expert interviews with respondents who either specialized in heat stress planning or members of the municipality council are being done.

To answer the main research question, the quantitative and qualitative methods are implied. The quantitative method is done by asking at least a hundred citizens of Utrecht to fill in a questionnaire about whether they are aware of the heat stress measures the municipality has taken so far. The target group of people that is asked to fill in the survey is part of the ‘normal’ citizens of the municipality of Utrecht. This is because the communication in Utrecht about heat stress is focused on vulnerable citizens and farm animals. Vulnerable citizens are informed by individual caretakers, healthcare organisations and companies or industries that hold animals by the local government (Gemeente Utrecht, 2022). With ‘normal’ citizens they communicate through social media what kind of cooling services there are in the city and what they can do on their own against heat and to help vulnerable citizens and animals. It is interesting to see whether ‘normal’ citizens are being well informed on this because they get approached not directly as the vulnerable citizens and companies with farm animals are. The “normal” citizen group still contains citizens who are vulnerable to heat stress but do not receive direct healthcare and therefore they need information about what to do to prevent it.

This means that in this research the mixed research method is implied. First, the expert interviews are held and then the surveys. This is because the interviews help with refining the survey on what to focus on in terms of heat stress measures and so on.

The time planning entails the feasibility of achieving the answer to the research question of a thesis (van Thiel, 2014). The time planning of this thesis is developed and is findable in 10.1. of the attachments.

Case study

Case studies are being evaluated on advantages and disadvantages (Walton, 1972) and are up for discussion on whether it is useful in scientific methods (Krusenvik, 2016). The case study method is commonly accepted to generate hypotheses for further research, but beyond that, a consensus is lacking (Krusenvik, 2016; Walton, 1972). Advantages of this method include its grounding in real-life situations, provision of in-depth data, and ability to promote comprehension of complex scenarios experienced by everyday people. Detailed and

contextualized results can lend strength to previous research and spark new theories. However, detractors criticize the limited generalizability and rigour of case studies, questioning their scientific validity due to researcher influence and bias. While some researchers support case studies as a means of developing explanatory theories, others view them as solely exploratory. Opposing views exist regarding the use of surveys and experiments versus case studies, with overall conclusions suggesting higher internal validity and lower external validity for the latter. While the scientific value of case studies is debated, they remain a popular research method. Ultimately, the case study approach should be used when it is the most appropriate method for addressing the specific research problem (Krusenvik, 2016).

The case study method offers the opportunity to thoroughly investigate critical events, interventions, policy developments, and service reforms in real-life settings. This approach should be utilized when an experimental design is either inadequate or impossible to employ in addressing the research questions at hand. While the business, law, and policy fields acknowledge the value of case studies, it is less recognized in health services research. However, with the increasing frequency of innovation implementation in healthcare settings, and the case study's potential to provide an in-depth and nuanced analysis of complex health service research, it should be more widely considered by researchers. Although challenging, with careful conceptualization, thoughtful execution, and thorough reporting, the case study method can reveal powerful insights into many important aspects of health and healthcare delivery (Crowe et al., 2011). This makes the analysis of the heatplan of the municipality of Utrecht (2022) appropriate for a case study because the heatplan concerns reducing deadly consequences of heat stress which is a form of healthcare.

4.2. Research methods, data collection and data analysis

This research implies the mixed research method. Mixed methods research is still debatable within research methodology terms and discussions. The ones who advocate the mixed methods uphold this method as a supportive method towards the best aspects of qualitative and quantitative research (Holland, 2016). While opponents feel that the differences between the two methods make them too hard to evaluate and integrate. The qualitative method is focused on behaviour, beliefs and dynamic concepts which are subjective and about the context. The quantitative method is focused on conceptualising a phenomenon by researching measurable static and objective factors (Holland, 2016). However, regarding quantitative aspects of validity and reliability, those are used in quantitative and qualitative method research. Reliability and validity are seen as objective truths that must be explained, which is the opponent of the relativism of the qualitative method. Therefore, the purpose of the mixed methods implementation is to increase the integration of the social reality of the qualitative method and the physical reality of the quantitative method (Holland, 2016). With mixed methods, inductive and deductive arguing can be combined. This results in data that gives a more holistic approach to answering the research question and gives insight into how researchers and individuals exactly behave. Mixed methods, therefore, can align multiple lines of evidence and create a more detailed answer. This answer upholds a more complex way of human life and behaviour (Holland, 2016).

Qualitative method

In the case of the qualitative method, there are four expert interviews done. These are done with the Delphi method. This method is a certain technique to interview a group of experts about a specific subject (van Thiel, 2014). These interviews are held through a video call. In

advance, interview guides are developed to guide the conversation. The data collected from the first interview is helpful for the second, the second for the third and the third for the fourth. By comparing the data from the four interviews while analysing, biased opinions of the interviewees can be detected. The data that is collected is transformed into transcripts and analysed in the program Atlas.ti to help answer all sub-questions. After developing a network for the sub-questions (with their relation to the heatplan) and the set of indicators that are about transferability and monitoring, the results are analysed, discussed, and concluded.

Quantitative method

In the case of the quantitative method, there is a survey done. This is in the form of a virtual survey with a written questionnaire. Surveys are known as one of the best performances of doing research. These are especially often done in customer research. The data that can be collected from the many respondents with surveys is high. This makes this research method efficient. The questions within the survey are as required, clear and unambiguous. They are not leading, making statements, or influencing the respondents towards a certain answer. There are as many as possible same answer categories, which helps the respondents not get confused (van Thiel, 2014). This leads to questions that are not biased. Which leads to a questionnaire that is not biased and more reliable.

The questionnaire is a closed-ended format, which means that respondents are asked to choose from a set of answers. The survey is in Dutch because this decreases the possible struggle of some citizens of Utrecht who are not good at reading and understanding English. The questionnaire has four categories. The first two questions of the first category are included in the survey to make sure the target group and the respondents who fill in the survey are correct. These only are included in analysing the data matrix but are not analysed with SPSS. The rest of the questions of the first category are about the profile of the respondents, for example, age, gender, and level of education. The second category is about the indicators of citizens' involvement. For example, questions about the implementation involvement, ownership and responsibility, and adoption in the community. The third category entails questions about the indicators of health and well-being. For example, physical and mental, access and awareness, and the impact. The fourth and last category is about the effectiveness of the heatplan. There are two (the first two) dichotomous questions with the answers yes or no. However, most questions have multiple answers to choose from. There is only one question that has three answer possibilities, and the rest has five answer possibilities. This is aside from the questions about the effectiveness of the heatplan, where the respondents can rate their answers on a scale of 1 to 5. The last question is an open one, about whether the respondents have still something to share or not. Therefore, the form of the question is influenced by the goal of the question. For example, there are two options (yes or no) as a possible answer when the goal of the question is to get a yes or no answer. There are twenty-six questions, and the survey costs a maximum of eight minutes to fill in.

The survey is sent out through a link via WhatsApp, Facebook groups, email, and the app Next Door. Next Door is an app where citizens can get connected with their neighbours. Many citizens who live in different parts of the municipality of Utrecht use that app. An account is created that is in a neighbourhood of Utrecht that makes sure the survey is reached by the citizens living near that location. The respondents are asked whether they give consent or not that their answers are conducted and used in this research. The questionnaire is performed by the program Qualtrics, which collects the data into an Excel document. This Excel document, the data matrix, is used in the program SPSS. With the program SPSS the data that has been collected is re-coded, categorised, and processed. This is all that is required for good quantitative research which makes the data suitable for analysis (van Thiel, 2014). Then certain tests are done to research the variables and see if they correlate.

To analyse the correct data, the correct data to process is needed. Data that gives us the correct answers to analyse if the conceptual framework of this research mentioned earlier is complete and correct. In Table 2. information is given about which questions (found in 10.2.2 of the attachments) in the survey are used to get certain data, with certain SPSS tests and are put in certain SPSS Output Attachments.

Table 3. Data process

Test question... (Independent variables)	With question... (Dependent variables)	Data received/needed	SPSS-test	SPSS Output in Attachments
3 up to and including 5 and 26: Age, gender, and education and effectiveness heatplan		Summarize demographic characteristics of respondents	Descriptive statistics	Part I
3 t up to and including 5: Age, gender, and education	26: Rating effectiveness of heatplan	Correlation between respondents' profile and rating effectiveness heatplan	Correlation analysis with the Spearman's rank correlation for 3 and 5 And for 4 the point-biserial correlation	Part II
6 & 7: Implementation involvement	22, 23 & 26: Rating their citizens involvement, influence involvement on effectiveness and effectiveness of heatplan	Correlation between implementation involvement with citizens involvement and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part III
8 t up to and including 10: Ownership responsibility	22, 23 & 26: Rating their citizens involvement, influence involvement on effectiveness and effectiveness of heatplan	Correlation between ownership and responsibility with citizens involvement and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part IV
11: Adopting in community	22, 23 & 26: Rating their citizens involvement, influence involvement on effectiveness and effectiveness of heatplan	Correlation between adopting in community with citizens involvement and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part V

22 & 23: Rating their citizens involvement and influence involvement on effectiveness	26: Rating effectiveness of heatplan	Correlation between influence citizens involvement and effectiveness heatplan	Correlation analysis with the Pearson's correlation coefficient	Part VI
12 & 13: Physical and mental health	24 up to and including 26: Rating their health and well-being, influence health on effectiveness and effectiveness of heatplan	Correlation between physical and mental health with health and well-being and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part VII
14 & 15: Access and awareness	24 up to and including 26: Rating their health and well-being, influence health on effectiveness and effectiveness of heatplan	Correlation between access and awareness with health and well-being and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part VIII
16: Impact	24 t up to and including 26: Rating their health and well-being, influence health on effectiveness and effectiveness of heatplan	Correlation between impact with health and well-being and effectiveness heatplan	Correlation analysis with the Spearman's rank correlation	Part IX
24 & 25: Rating their health and well-being and influence health on effectiveness	26: Rating effectiveness of heatplan	Correlation between health and well-being and effectiveness heatplan	Correlation analysis with the Pearson's correlation coefficient	Part X
17 up to and including 19 & 21: Information given and if they are following social media	20: How well informed on heat stress	Correlation between information given on heat stress, if they are following social media and how well they have been informed	Correlation analysis with the Spearman's rank correlation And for 19 Chi-Square analysis	Part XI
20: How well informed on heat stress	26: Rating effectiveness of heatplan	Correlation between how well they have been informed and effectiveness of heatplan	Correlation analysis with the Spearman's rank correlation	Part XII

Why these tests

The respondents' profile is analysed by doing descriptive statistics about the third, fourth and fifth questions, about age, gender, and education. This summarizes the demographic characteristics of respondents. Furthermore, the descriptive statistics of the variable about whether the heatplan is effective are analysed.

The respondents' profile is tested with the correlation analysis on whether there is a statistically significant correlation with the rating of the effectiveness of the heatplan. This is because the dependent variable is ordinal (question twenty-six), and the independent variables include ordinal and categorical variables. Where Spearman's rank correlation coefficient is used for ordinal variables and point-biserial correlation is used for the categorical variable.

To analyse the question about the implementation involvement (questions six and seven) with the citizens' involvement and the effectiveness of the heatplan, a correlation analysis test is done. The Spearman's correlation is appropriate for assessing relationships between the ordinal dependent variables (question twenty-two, -three and -six) and the interval variables (question six and seven). The same goes for the interval variables about the ownership responsibility (question eight, nine and ten). Furthermore, for the interval variable about adopting in the community (question eleven).

To analyse the correlation between the influence of citizens' involvement with the effectiveness of the heatplan, the correlation analysis test is done. However, then with the Pearson's correlation coefficient since all these variables are on an interval scale (question twenty-two, -three and -six). The same goes for the correlation between health and well-being and the effectiveness of the heatplan (question twenty-four, -five and -six).

To analyse the questions about physical and mental health (questions twelve and thirteen) with the health and well-being and the effectiveness of the heatplan (questions twenty-four, -five and six) the correlation analysis test should be done. The Spearman's correlation is appropriate for assessing relationships between the ordinal dependent variables (questions twenty-four, -five and -six) and the interval variables (questions twelve and thirteen). The same goes for the interval variables about access and awareness (questions fourteen and fifteen). Furthermore, for the interval variable about the impact (question sixteen).

To analyse the correlation between the information given on heat stress and if they are following social media (questions seventeen, eighteen and twenty-one) with the variable on how well they have been informed (question twenty), a correlation analysis is done. The Spearman's rank correlation coefficient is used since all variables are on an ordinal scale. The same goes for the analysis of the correlation between how well they have been informed (question twenty) and the effectiveness of the heatplan (question twenty-six). The variable about by whom they have been informed (question nineteen) and its relation to how well the respondents feel that they have been informed (question twenty) is analysed with a Chi-square test. This is because both variables involve categorical variables, and one has multiple options. Here the coherence measure Kruskal-Wallis is used. This coherence measure is used because it is fit for analyses between variables that are ordinal.

While processing the data in SPSS, the tests that are planned to be done, are checked again to see if that specific test is the best option to get the best results of analyses.

How to analyse

To analyse the results, descriptive statistics are asked, and the correlation analysis test is done. The correlation analysis is done with Spearman's rank correlation, the point-biserial correlation and Pearson's correlation coefficient.

There are three different correlation coefficients with the correlation analysis. The first is Spearman's rank correlation coefficient. The coefficient ranges from -1 to 1. A positive value indicates that as one variable increases, therefore will the other variable increase. A negative value indicates that as one variable increases, the other will decrease. The closer the value is to -1 or 1, the stronger the correlation between the variables is. The significance level (p-value) of Spearman's rank correlation tells us whether the correlation is significant or not. If the p-value is below the 0,05, then the correlation is statistically significant. The null hypothesis is shifted. The correlation between the variables can be visualized by devolving a scatterplot (Field, 2018).

The second coefficient is point-biserial. The coefficient ranges from -1 to 1. A positive value indicates that as the one variable continues to increase, therefore will the other variable increase the chances of being in the "1" category of the variable. A negative value indicates that as one variable continues to increase, therefore will the other variable increase the chances of being in the "0" category of the variable. The closer the value is to -1 or 1, the stronger the correlation between the variables is. The significance level (p-value) of the point-biserial tells us whether the correlation is significant or not. If the p-value is below the 0,05, then the correlation is statistically significant. The null hypothesis is shifted (Field, 2018).

The last coefficient is Pearson's correlation. The coefficient ranges from -1 to 1. A positive value indicates that as one variable increases, therefore will the other variable increase. A negative value indicates that as one variable increases, the other will decrease. The closer the value is to -1 or 1, the stronger the correlation between the variables is. The significance level (p-value) of Pearson's correlation tells us whether the correlation is significant or not. If the p-value is below the 0,05, then the correlation is statistically significant. The null hypothesis is shifted. The correlation between the variables can be visualized by devolving a scatterplot (Field, 2018).

There is a Chi-Square analysis with the coherence measure Kruskal-Wallis done. Here Cross-tabulations are needed. If the p-value is smaller than 0.05 then the null hypothesis is rejected and there is a correlation between the variables. If the p-value is bigger than 0.05 then the null hypothesis is not rejected and there is no correlation, which means that there is no significance (Field, 2018).

After analysing the data with certain tests with the program SPSS, the data is reported in a specific chapter and analysed. This is done to see whether the indicators of health and well-being and citizens' involvement influence the effectiveness of the heatplan. Furthermore, to see how effective the heatplan is. The conceptual model is analysed with the actual results from the research by looking at the correlations between multiple variables. After this, the data is discussed and concluded. Furthermore, the main research question is answered.

To get a more holistic approach towards the research, the data from the quantitative and qualitative research on the effectiveness of the heatplan, are compared with each other in the discussion when analysing the data.

4.3. Validity and reliability of the research

To increase the validity and reliability of this research the following actions take place. In the case of qualitative research, as explained earlier the validity and reliability can be checked

regarding the expert interviews by comparing them while analysing. Because by doing that biased opinions of the interviewees can be detected. In the case of quantitative research, certain actions can be done to ensure reliability and validity. Especially in the survey, it is ensured that the answer categories of the questions always agree and disagree with variables and always or never create extreme answer categories. The questions always have a few or many possible answers and previous questions are used as a guiding line (van Thiel, 2014). The data is inspected before analysing them, which means searching for any mistakes. To increase the validity and reliability of the survey even more, the survey is piloted with other respondents who are not included in the data research itself. The survey is piloted four times with four different respondents. This is to analyse the feedback from those respondents on how long it takes to fill in the survey, if the questions are good to understand, comfortable to answer and if there is any room for improvement. This is reflected in the data process and helps improve the validity and reliability of this research.

5. Data process

5.1. Qualitative research

The expert interviews that took place were with four experts on developing local and national heat plans. The Delphi method was used which entails that every interview guide for every next interview was adapted at the hand of the interview before. The four interviewees were the two creators of the heatplan Jeanne Gootzen and Jeanet Hekhuis; GGD Utrecht employee Nienke Sluis; who is trying to stimulate other municipalities to develop a heatplan and RIVM employee Werner Hagens; who concerned himself over the National heatplan. The contact was through Linked In and then via email. The interviews were planned fast, and the transcripts were developed with the help of four recordings made while interviewing.

After the transcripts were developed, they were analysed in Atlas.ti. Here five different code groups were made. Four of them resemble the transferability and monitoring factors which will show whether they influence the effectiveness of the heatplan. Furthermore, one of the code groups named 'Implementation' will help answer the sub-questions. The four code groups 'City budget, Transfer of actions, Integrated governance and Long-term viability' will present a different network of to what extent they influence the effectiveness of the heatplan. From that network and notes that were developed by analysing the transcripts, emerged data. This data analysis is written down in the paragraph data analysis and discussed in the discussion. By comparing the data from the four interviews while analysing for better validity and reliability, biased opinions of the interviewees were analysed but not detected.

5.2. Quantitative research

After the interviewees were analysed, the data stimulated a better process of creating the survey. The data of the interviewees guided the development by giving more focus on what questions to ask and not to forget to add some. The virtual survey was in the form of a written questionnaire developed in the program Qualtrics. To ensure the reliability and validity of the survey, the questions were not leading, making statements, or influencing the respondents towards a certain answer. There were as many as possible same answer categories (and in number), agree and disagree answer categories and no extreme answer categories.

Furthermore, the previous questions were used as a guiding line. The survey was piloted four times. The first pilot was done for spelling and grammar checking and the understandability of the questions. The second one was done for the same as for timing the number of minutes it took to fill in the survey. A few mistakes in grammar, spelling and formulation of the questions came up and were corrected. The same goes for the third and fourth pilots. Every time the survey took seven to eight minutes to complete. After a search on the social media of the municipality of Utrecht about heat, the following was found. Only on the 16th of June in the pre-summer of 2023, a post appeared on Instagram (see Attachments 10.5, Figure 8). Furthermore, two posts on Facebook were found in July and August in the summer of 2022 (see Attachments 10.5, Figures 6&7). On Twitter, nothing about the heat was found. This means that in two years, the municipality of Utrecht tried to connect with the normal citizens through social media three times. The survey was amended so that it would be clear that the questions about effectiveness are about the past two years, which will increase the reliability because the posts from last year could have had an effect. The survey was sent out through a link via WhatsApp, Facebook groups, email, and Next Door on the 13th of October.

After a month there were 139 respondents and after two and a half months there were 217 respondents. Which means 217 respondents started to fill in the survey. Unfortunately,

sixteen respondents did not answer the first question(s), two respondents filled in that they do not live in the municipality of Utrecht and two respondents filled in that they do receive direct care (which means that they scale under the vulnerable citizens). Then there were 197 respondents. After two and a half months, the survey was closed, to move on with the dataset. The dataset was easily downloaded for SPSS from Qualtrics. This made adjusting the dataset easy to do. On Qualtrics it was seen what the answers were in percentages, numbers, and bar charts. Which contributed to the analysis of the results on SPSS. However, analysing the dataset that was downloaded from Qualtrics, it caught my eye that some respondents did not fill in the entire questionnaire. Therefore, the last question has not 197 respondents but 147 respondents.

To ensure the reliability and validity of the data matrix and therefore the tests, the data was inspected before analysing, which means that there was a search for anything that had to be fixed or deleted. For example, the categories IP address and Response ID were deleted. Those who filled in that they do not live in the Municipality of Utrecht or that they received direct healthcare, were deleted from the data matrix. After the data matrix was inspected, there was an analysis about which tests had to be done. Then the tests were done in SPSS and the results were analysed and compared for a holistic approach.

The data analysis was written down in the paragraph data analysis and discussed in the discussion of conclusions. After that, a summary of a conclusion was developed, and the main research question was answered.

6. Data analysis

Respondents' profile

Regarding the respondents' profile of the survey (see Attachments 10.4. Output SPSS Part I), it is analysed that the citizens who filled in the survey are 60+ (78). Two times more than the age of 50-59 (43). The 18-29 age range has a count of 32. Twenty-five respondents are aged between 40 and 49. Furthermore, only nineteen respondents are between 30 and 39. The respondents were three times more female than male. Most respondents who filled in the survey have a WO Master's diploma (88). Twenty respondents more than the respondents that have an HBO diploma (68). Twenty-two respondents have an MBO diploma. Furthermore, ten respondents have a secondary school diploma. Furthermore, only nine respondents have a WO Bachelor's diploma.

Regarding if there is a correlation between the respondents' profile and whether they believe the heatplan is effective it is analysed (see Attachments 10.4. Output SPSS Part II) that the age of the respondents has no significant correlation with how they rated the effectiveness of the heatplan. The gender of the respondents has no significant correlation with how they rated the effectiveness of the heatplan. However, the education of the respondents who filled in the survey does have a significant correlation with how they rated the effectiveness of the heatplan. The Spearman's rank coefficient is -0.238. The coefficient is negative, which means that as one variable increases, the other will decrease. Therefore, when education is getting on a higher level, the ranking of the effectiveness of the heatplan is getting lower.

6.1. Implementation, Obstacles & Communication

The municipality of Utrecht started developing the heatplan just a few months before the summer of 2022. This is because at first, the goal was more to develop the policy rather than already implement it (see Transcripts Expert interviews analysis Atlas.ti project). The goal for that summer was to focus on the vulnerable group. The 'normal' citizens were not yet the focus and therefore were not evaluated the same. The municipality is talking with housing associations about bad isolated houses but nothing concrete has been discussed yet. In the beginning, the GGD (Municipal Medical Service, but in Dutch GGD) Utrecht sat down with the municipality to discuss certain important factors to focus on or not forget. The municipality arranged a meeting for possible local stakeholders who could help with the heatplan, where the GGD did a presentation (see Transcripts Expert interviews analysis Atlas.ti project).

From May the RIVM (National Institute for Health and Environment, but in Dutch RIVM) is communicating with their contacts to ensure that everybody has their communication tools ready. The RIVM has a close connection with the KNMI, who will contact them about the weather in the Netherlands. The municipality of Utrecht receives an email when that overall hotter period is coming up and the National heatplan is being activated. This is code green, which means that the municipality must have its communication tools ready for sharing when needed (see Transcripts Expert interviews analysis Atlas.ti project). They get an email when it is code yellow when the temperature is over 27 degrees for four or more days. The municipality now must inform the citizens of the city. Next is code red, which means it will get even hotter, which means that the municipality must inform the citizens of the city. For now, they have not yet decided what code red exactly is. When code yellow or red is in place, the municipality has communication schemes with whom to contact in their organisation but furthermore organisations outside their own for example, healthcare or kinder gardens. In the emails they send inside their organisation, the

municipality makes sure to send out information on social media on Facebook, Twitter, and Instagram (see Transcripts Expert interviews analysis Atlas.ti project). These messages sometimes entail links to the RIVM site and information and are mainly for the ‘normal’ citizens. In the emails outside their organisation, they ask the organisations and contacts to send information, for example, posters and flyers about heat stress to their contacts. This way the municipality hopes to reach the vulnerable citizens who receive healthcare. Last summer in 2022, the municipality had two hot periods where the heatplan was activated and they sent out their emails. At the end of a hot period or heat wave the RIVM emails among others the municipality of Utrecht that the hot period or heat wave is over (see Transcripts Expert interviews analysis Atlas.ti project).

The National heatplan is under the control of the RIVM. When this plan is activated, local heat plans are activated automatically. The RIVM has contacts, for example, the National General Practitioners’ Association and the National Healthcare Organisation Association. The municipality of Utrecht has their contacts but more local, for example, a certain nursing home. The municipality can arrange meetings for example, with all general practitioners of the municipality of Utrecht. Regarding heat stress, it is handled from the top-down and bottom-up methods. The top-down part is being handled by the RIVM which has contact with national associations (see Transcripts Expert interviews analysis Atlas.ti project). Furthermore, the bottom-up part is being handled by the municipality which has contacts with smaller local associations and individuals. The positive side of a local heatplan is that it can use local parties who are already in place at certain locations. It can use the social structures that are already there because when dealing with heat there is no room for installing whole new structures. Organisations are not ready to join a new structure they do not know, which makes it better to join an already known structure (see Transcripts Expert interviews analysis Atlas.ti project). For example, the RIVM concerns themselves about the Netherlands, the GGD about the province and the municipality about local situations in and around cities. By making agreements more and more organisations and citizens know what they can expect and what they are meant to do about heat stress. Heat stress will become more top of mind. The awareness of heat stress increases and because multiple parties are working on it, therefore the acceptance of the measures will increase (see Transcripts Expert interviews analysis Atlas.ti project).

Obstacles

A few obstacles came up during and after the implementation of the heatplan of Utrecht. The municipality is talking with housing associations about bad isolated houses but there are more house owners in Utrecht. This means that informing citizens on how to improve heat stress measures in and around houses is needed to increase. This is a problem in need of attention, but for now is not the focus. Many contacts are on vacation in the summer period phase. This means that they cannot inform their contacts about heat stress, therefore the monitoring of the heatplan was difficult (see Transcripts Expert interviews analysis Atlas.ti project). The difficulty with this is that actions such as these that are not regular are hard to take over when someone is on vacation. The municipality internally has a backup for informing their contacts, but the question remains whether the contacts of the other organisations have that. The municipality did evaluate their contacts but does not know who the next line of contacts is and how they experienced the heatplan. The municipality knows what they sent out but not how it was received. Further, there are citizens in the “normal” group who are vulnerable to heat stress. This means that focusing on only the vulnerable group is not enough to ensure that all vulnerable citizens have information about heat stress. Due to privacy reasons, the municipality cannot just contact citizens with bad health (see Transcripts Expert interviews

analysis Atlas.ti project). Furthermore, even when they do that, the mailing list would have to be updated continuously because of the chances that those vulnerable citizens already have passed.

At first, it was not clear who was going to take this extra task about heat stress. The communication colleagues of the municipality were already doing other tasks and almost nothing had to do with climate change. This area was new for most of them. Therefore, an obstacle to the development and implementation of the heatplan was that it was not fully clear who the owner of the problem heat stress was (see Transcripts Expert interviews analysis Atlas.ti project). However, talking about heat stress can be done in long-term planning climate adaptation to reduce heat stress in the physical domain. Furthermore, short-term communication with the citizens to reduce heat stress in the social domain. There is the planning department which has their belongings in the physical domain and the communication department which has their belongings in the social domain. Within the municipality, there are now two groups that are talking about heat stress. They do not want to interfere too often with each other which causes unclarity about who deals with what when speaking, for example, about bad isolated houses (see Transcripts Expert interviews analysis Atlas.ti project).

Further, vulnerable citizens on average have bad health. Which makes heat stress a problem for healthcare organisations. They probably have many tasks to do already, but they could reach the vulnerable citizens even more than the municipality can. This is because the municipality does not have all the information about citizens and their health and contacts. Alongside the healthcare organisations, there are organisations for example, the Rode Kruis (Global assistance organisation from the Netherlands), Animal protection, RIVM and GGD that are stakeholders in the problem around heat stress and therefore are acting and taking measures to do something to reduce it. However, the municipality cannot force these organisations, especially the healthcare organisations anything. They just hope they do contact everyone who needs to hear the heat stress measures (see Transcripts Expert interviews analysis Atlas.ti project).

Communication with the ‘normal’ citizens

The communication of the heatplan of Utrecht has been overall focused on the vulnerable citizens described in the plan, this was the main goal. This is because there is the most concern about this group of citizens. Homeless people were not yet included in the communication about heat stress measures, but the municipality is brainstorming about that. The group of ‘normal’ citizens have not been the target. The municipality does not know whether the ‘normal’ citizens were informed enough. Normal citizens, for example, those who live in bad isolated homes, are trying to be reached through conversations by the municipality with housing associations. However, the municipality cannot impose anything (see Transcripts Expert interviews analysis Atlas.ti project). Many citizens who are not included in the vulnerable citizen group are vulnerable to heat stress. Citizens who are lonely or have heart problems, obesity or overall, bad health, are included in the ‘normal’ citizen group when they do not have any form of daily care. Because people with overall bad health go on average often to the general practitioner, the municipality tried to improve the connection with this group of citizens by informing general practitioners in a yearly session. The municipality is discussing options to put up posters and flyers at the general practitioners’ offices (see Transcripts Expert interviews analysis Atlas.ti project). The municipality does not have files of citizens with overall bad health, therefore contacting them is not easy. However, the RIVM made a map last year of the fragility index in certain

neighbourhoods. Which entails the percentage of elderly people who are fragile and therefore more vulnerable. Upcoming year they could combine that map with maps of houses that are badly isolated. By combining those two maps, hotspots could be clear therefore giving the municipality more direction of which neighbourhoods to focus on contacting heat stress measures with. Alternatively, maps with information where more lonely people live (see Transcripts Expert interviews analysis Atlas.ti project).

There has been communication with normal citizens so far through social media. Through Instagram, the municipality reached between 3000 and 3500 people, on Facebook 107000 people and through Twitter 3400 people (see Transcripts Expert interviews analysis Atlas.ti project). In these messages, there were messages for example, 'Watch over yourself and others around you'. Organisations for example, Rode Kruis, GGD, RIVM, papers and radio communicate about heat stress themselves. The RIVM has the goal to reach vulnerable citizens, what they, for example, try to do via healthcare organisations. The RIVM uses social media to reach the 'normal' citizens of the Netherlands. For example, with infographics, small movies, and options to get your questions answered through the site. Overall, more and more citizens are getting informed about heat stress and the consequences it has on vulnerable citizens through multiple organisations (see Transcripts Expert interviews analysis Atlas.ti project).

The expert interviews entail that the way the heatplan is implemented influences the effectiveness of the heatplan (see Transcripts Expert interviews analysis Atlas.ti project).

6.2. Transferability and monitoring

Integrated governance

There are many stakeholders involved regarding heat stress measures. The heatplan includes them by contacting them through email. First are all healthcare organisations obliged to take care of the health of people, which means that they furthermore will do so when it comes to heat stress. Organisations for example, the GGD, Rode Kruis and Animal Protection that were included in the heatplan have their social media, where they inform citizens what to do about heat stress (see Transcripts Expert interviews analysis Atlas.ti project). Animals were mostly covered by contacting primarily pet boarding houses, Managers and pet shops. However, the mailing list was not complete yet last year and livestock farms were missing. News channels, for example, newspapers and radio take a role in informing the citizens what is about to happen and which heat stress measures they could take when necessary. National organisations for example, the RIVM and the National General Practitioners' Association will inform their contacts through social media because it is their goal to reduce heat stress (see Transcripts Expert interviews analysis Atlas.ti project).

When speaking of supporting and implementing the local heatplan of the municipality of Utrecht, quite some stakeholders do so. The RIVM has their own National heatplan and social media for example, the site, which supports the local heatplan of Utrecht and the information the municipality gives about heat stress measures. The local heat plans are an addition to the National heatplan. After the National heatplan has been activated the local heat plans take over. The radio and papers for example, the AD and De Duik (local paper of Utrecht) support the heatplan by informing citizens of Utrecht on social media and so on (see Transcripts Expert interviews analysis Atlas.ti project). The GGD, Rode Kruis and Animal Protection implement the heatplan by informing their contact as well as possible about the heat stress measures on social media mostly. The Rode Kruis was handing out flyers at the mosque in different languages than Dutch and handing out flyers with the free meals they

gave away. The GGD tries to stimulate as many as municipalities possible to make a heatplan and help them develop one (see Transcripts Expert interviews analysis Atlas.ti project). The Province of Utrecht played a role in stimulating the municipalities, by guiding them with advisory bureaus. The GGD helps answer questions to citizens about heat stress and health. The municipality in contrast helps answer questions more about where to swim and water quality. The GGD and the GHOR are included in the heatplan regarding informing event holders what to do when it gets hot during their event. For example, with the Tour de la France a few years ago in Utrecht. When the heat becomes a disaster, the GHOR steps in (see Transcripts Expert interviews analysis Atlas.ti project).

City budget

Last year the budget for the heatplan was 3000 euros. The creator of the heatplan of Utrecht asked a bit more for the upcoming year (summer 2023). Overall, the communication has been done in digital ways, except for the flyers that were handed out by the Rode Kruis. It costs just time to create, implement, evaluate, and monitor the heatplan instead of money. If there were more money for improving the heatplan a researcher could have been hired to evaluate the heatplan (see Transcripts Expert interviews analysis Atlas.ti project). However, then again, many people are on vacation in the summer. This includes students who could take an internship, which would cost not a large amount of money. Furthermore, there is the problem that even if the municipality could hire a billboard or advertisement in the papers, it is needed to do so a few months in advance. Which is difficult because they cannot predict the weather a month in advance. It could be raining when the municipality has planned for a commercial on the radio for example. However, then again radio programmes and papers would be talking about the upcoming heat. However, reaching the group of citizens who are not well in digital ways, is a challenge for the municipality (see Transcripts Expert interviews analysis Atlas.ti project).

Long-term viability

When talking about the financial aspects of the heatplan in combination with the long-term viability, money is not a problem. For now, the heatplan is being evaluated as far as possible and improved where needed. There is no need for more money to keep up the heatplan. When the temperature gets hotter and hotter, maybe water sprinklers are needed to install. However, which policy, for example, the heatplan, will facilitate that is not clear yet (see Transcripts Expert interviews analysis Atlas.ti project).

Monitoring the heatplan of the municipality of Utrecht is quite difficult because many stakeholders are involved. Sending out evaluation forms is one side of the story, but that citizens fill them in is another. Evaluating and monitoring the heatplan does not cost money but time. This is a problem for the municipality because they do not have to do better than they already are (see Transcripts Expert interviews analysis Atlas.ti project). There are some points where the municipality thinks they could improve regarding evaluating and monitoring which in terms could help improve the heatplan. This is because while monitoring the heatplan problems and improvements become clearer. The heatplan includes monitoring every year which will help improve it. They first focussed on the vulnerable citizen group and want to expand while the heatplan is improving (see Transcripts Expert interviews analysis Atlas.ti project).

The municipality thinks the timing of the heatplan with the three phases of preparation, summer period and adjusting are efficient. Furthermore, the three phases in the summer period phase vigilance, pre-warning and warning phase are efficient. Although it is

not decided yet what code red exactly is, these three phases are experienced fine. Nothing tells the municipality to change that when evaluating. There is a script made which entails every step to take and when. The vigilance phase is efficient where everyone gets the time to get ready and ask questions before contacting when needed in a hot period (see Transcripts Expert interviews analysis Atlas.ti project).

Transfer of actions

The municipality has done what is described in the heatplan. There are still actions to take, for example, improving the social media material and including homeless people.

Furthermore, monitoring the communication system of the heatplan requires improvement. However, overall, there have been enough actions in one year of creating the heatplan and implementing it. The GGD Utrecht is acting in stimulating other municipalities to create a heatplan and helping them with creating one. The GGD does this by informing them about why a heatplan is needed and the Province of Utrecht is doing this by offering advisory bureaus (see Transcripts Expert interviews analysis Atlas.ti project).

6.3. Citizens' involvement

Implementation involvement

Regarding the implementation involvement (questions six and seven, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there is no significant correlation found with how they rated their citizens' involvement, the influence of the citizens' involvement on the effectiveness of the heatplan and the effectiveness of the heatplan itself (see Attachments 10.4. Output SPSS Part III).

Ownership and responsibility

Regarding the ownership responsibility (questions eight, nine and ten, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there are significant correlations found. Regarding whether (question eight) the respondents use measures during hot periods to prevent heat stress and how they rate their own citizens' involvement there is a correlation (see Attachments 10.4. Output SPSS Part IV). The coefficient is 0.199, which means that it is not a strong correlation but when the measures that have been used increase therefore does slightly their rating of their citizens' involvement.

Regarding whether (question nine, see Attachments 10.2.2. Interview guides Survey) the respondents consulted vulnerable citizens around them during a hot period the past two years about what to do to prevent heat stress and how they rate their own citizens' involvement there is a correlation (see Attachments 10.4. Output SPSS Part IV). The coefficient is 0.368, which means that it is not a strong correlation but when consulting vulnerable citizens around them increases, therefore slightly their rating of their citizens' involvement. There is a correlation between the variable of how often the respondents consulted vulnerable citizens around them (question nine, see Attachments 10.2.2. Interview guides Survey) and whether how they rate their citizens' involvement influences the effectiveness of the heatplan. The coefficient is 0.247. This tells us that the correlation is not strong but when consulting vulnerable citizens around them increases, therefore the rating on how the citizens' involvement influences the effectiveness of the heatplan (see Attachments 10.4. Output SPSS Part IV).

The variable about whether the respondents have taken measures for their pet(s) during a hot period to prevent heat stress (question ten, see Attachments 10.2.2. Interview guides Survey) correlates with how the respondents rated their citizens' involvement. The

coefficient is 0.213. Therefore, the correlation is not strong but when the measures that respondents took for their pets increase, therefore does the rating of their citizens' involvement (see Attachments 10.4. Output SPSS Part IV).

Adopting in community

Regarding adopting the heatplan in the community (question eleven, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there is a significant correlation found. Regarding whether (question eleven) the respondents share with others on social media during a hot period what to do to prevent heat stress and how they rate their own citizens' involvement there is a correlation (see Attachments 10.4. Output SPSS Part V). The coefficient is 0.204, which means that it is not a strong correlation but when the sharing on social media increases therefore does slightly their rating of their citizens' involvement.

6.4. Health and well-being

Physical and mental health

Regarding the physical and mental health indicators (questions twelve and thirteen, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there is one significant correlation found. Whether the respondents participate in outdoor activities (question twelve, see Attachments 10.2.2. Interview guides Survey) does not correlate with the ranking of their health and well-being, the influence of health and well-being or their ranking of the effectiveness of the heatplan. However, how mentally satisfied the respondents are (question thirteen, see Attachments 10.2.2. Interview guides Survey) does have a significant correlation (see Attachments 10.4. Output SPSS Part VII). The coefficient is 0.461, which means that it is not a strong correlation but when the satisfaction mentally increases therefore does slightly their rating of their health and well-being.

Access and awareness

Regarding the access and awareness indicators (questions fourteen and fifteen, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there is one significant correlation found. Whether the respondents are aware of the heat stress problems and consequences (question fifteen, see Attachments 10.2.2. Interview guides Survey) does not correlate with the ranking of their health and well-being, the influence of health and well-being or their ranking of the effectiveness of the heatplan. However, whether the respondents have access from their home to places where there is cooling (question fourteen, see Attachments 10.2.2. Interview guides Survey) does have a significant correlation (see Attachments 10.4. Output SPSS Part VIII) with the rating of their health and well-being. The coefficient is -0.171, which means that it is not a strong correlation but when the number of meters to places with cooling is increasing (and the access is decreasing), their rating of their health and well-being decreases.

Impact

Regarding the impact indicator (question sixteen, see Attachments 10.2.2. Interview guides Survey) of the citizens that filled in the survey, there is one significant correlation found. The impact on the citizens that heat stress has does not correlate with the ranking of the influence of health and well-being or their ranking of the effectiveness of the heatplan. However, the impact of heat stress on citizens does have a significant correlation (see Attachments 10.4. Output SPSS Part IX) with their rating of their health and well-being. The coefficient is -0.191, which means that it is not a strong correlation. However, when the impact of heat

stress on their life, work, and happiness increases, their rating of their health and well-being decreases.

6.5. Effectiveness of heatplan

The experts' interviews entail that the effectiveness of the heatplan is connected to the transferability and monitoring of the heatplan (see Attachments 10.3. Output Atlas.ti). When the municipality knows what the load of information is, then they know what to improve. The interviews (see Transcripts Expert interviews analysis Atlas.ti project) entail that it is hard to rate the effectiveness of the heatplan of the municipality of Utrecht. This is because multiple factors and organisations play a role in whether citizens do something about heat stress or know what to do in the first place. Not only the channels of the municipality are informing citizens about heat stress, but furthermore others, for example, the radio and papers. The effectiveness is hard to rate because it is difficult to analyse and monitor the full effectiveness of contacting healthcare organisations for example. Because it depends on whether they spread the information or not, the municipality furthermore for example, the RIVM cannot force them to do so (see Transcripts Expert interviews analysis Atlas.ti project). Therefore, the effectiveness of the heatplan is hard to rate. Therefore, the process is easier evaluated by the municipality than the effectiveness. Even when they send out evaluation forms, not everybody fills them in. The creators still rate the effectiveness of the heatplan with that in mind at 3/3.5 (from a scale of 1-5). The heatplan is a work in process and is evaluated every year, which means it cannot be a five, but it still has a good basis for now the municipality thinks. Upcoming year the municipality decided to focus on improving what the heatplan is already about instead of adding more. They heard from their communication specialist that they already have a big reach of people on their social media (see Transcripts Expert interviews analysis Atlas.ti project).

Regarding the survey, a few analyses are made. The descriptive statistics of the variable whether respondents think the heatplan is effective or not in the survey (see Attachments 10.4. Output SPSS Part I) show us that the mean answer is 2.59.

Regarding the relation between the variable about whether the respondents believe they have been informed enough and how often they were informed (question seventeen, see Attachments 10.2.2. Interview guides Survey), there is a significant correlation found (Attachments 10.4. Output SPSS Part XI). The Spearman's rank coefficient is 0.403, which means that it is not a strong correlation. However, this means that the respondents believe that they have been informed more when they were more often informed.

Regarding the relation between the variable about whether the respondents believe they have been informed enough and how many messages on heat stress the respondents received (question eight-teen, see Attachments 10.2.2. Interview guides Survey), there is a significant correlation found (see Attachments 10.4. Output SPSS Part XI). The Spearman's rank coefficient is 0.227, which means that it is not a strong correlation. However, this means that the respondents believe that they have been informed more when they received more messages on heat stress.

Regarding the relation between the variable about whether the respondents believe they have been informed enough and by whom they received the messages (question nineteen, see Attachments 10.2.2. Interview guides Survey), the Kruskal-Wallis's coherence measure is not significant (Attachments 10.4. Output SPSS Part XI). This means there is no correlation between the variables.

Regarding the relation between the variable about whether the respondents believe they have been informed enough and whether they follow the municipality of Utrecht on social media (question twenty-one, see Attachments 10.2.2. Interview guides Survey), there is no significant correlation found (see Attachments 10.4. Output SPSS Part XI).

Regarding the relation between the rating of the effectiveness of the heatplan and the variable about whether the respondents believe they have been informed enough (question twenty, see Attachments 10.2.2. Interview guides Survey), there is a significant correlation found (see Attachments 10.4. Output SPSS Part XII). The coefficient is 0.203, which means that it is not a strong correlation. However, this means that when the effectiveness of the heatplan is rated higher, the respondents believe that they have been informed more.

Regarding the relation between the rating of the effectiveness of the heatplan and the variables how the respondents rate their citizen involvement and how they rate the influence of the citizens' involvement on the effectiveness of the heatplan (questions twenty-two and -three, see Attachments 10.2.2. Interview guides Survey), there are significant correlations found (see Attachments 10.4. Output SPSS Part VI).

The Pearson's coefficient of the correlation between the effectiveness of the heatplan and how they rate their citizens' involvement (question twenty-two, see Attachments 10.2.2. Interview guides Survey) is 0.374, which means that it is not a strong correlation. However, this means that when the effectiveness of the heatplan is rated higher, the respondents believe their citizens' involvement is high.

The Pearson's coefficient of the correlation between the effectiveness of the heatplan and how they rate the influence of the citizens' involvement on the effectiveness (question twenty-three, see Attachments 10.2.2. Interview guides Survey) is 0.479, which means that it is not a strong correlation. However, this means that when the effectiveness of the heatplan is rated higher, the respondents rate the influence of the citizens' involvement on the effectiveness higher.

Regarding the relation between the rating of the effectiveness of the heatplan and the variable of how the respondents rate their health and well-being (question twenty-four, see Attachments 10.2.2. Interview guides Survey) there is no significant correlation found (see Attachments 10.4. Output SPSS Part X).

Regarding the relation between the rating of the effectiveness of the heatplan and the variable of how they rate the influence of the health and well-being on the effectiveness of the heatplan (question twenty-five, see Attachments 10.2.2. Interview guides Survey), there is a significant correlation found (see Attachments 10.4. Output SPSS Part X). The coefficient is 0.355, which means that it is not a strong correlation. Therefore, this means that when the effectiveness of the heatplan is rated higher, the respondents rate the influence of health and well-being on the effectiveness higher.

7. Discussion of results

7.1. Implementation, Obstacles & Communication

Implementation

The goal of the heatplan was to rather develop the policy than already implement it perfectly and to focus on vulnerable citizens. Possible local stakeholders were stimulated by the municipality of Utrecht to contribute to the development of the heatplan. Here the GGD of Utrecht played a stimulating and informative part. The RIVM will communicate to their contacts (provinces, GGD, municipalities) when they need to have their communication tools ready and when and which code (green, yellow, or red) is in place. They have a connection with the KNMI and will activate the National heatplan when needed. This activation will automatically activate the local heatplan. The municipality of Utrecht, the RIVM and the GGD of Utrecht all have their contacts whom they email. They have their own social media accounts where they post messages about preventing heat stress during hot periods. However, the municipality of Utrecht has more local organisations as contacts than the RIVM and GGD. This makes heat stress being handled with a top-down and bottom-up approach. The local organisations help the heatplan to already contain more structure because otherwise, the structure of communication would have to be built more. The data indicates that the top-down and bottom-up approach is an efficient way to address the heat stress problem. However, there is still no definition of what code red is, which makes it rather hard to know what is the worst that can happen. Furthermore, what kind of action is most suitable for that situation.

Obstacles

There are a few obstacles. One of them is that many houses are badly isolated. The municipality is contacting housing associations, but there are more homeowners in Utrecht. Furthermore, the heatplan usually activates in the summer vacation period, which is an obstacle. It makes it harder to monitor the heatplan. This leads to the next obstacle. The municipality has a backup of tasks that need to be done by whom when the heatplan is activated. However, the question remains how other organisations handle this. Due to privacy reasons, the municipality does not know who all vulnerable citizens are, which makes it more difficult to know who to target. All actions from other local organisations have no obligation. This makes it hard to see the whole heatplan communication through. Healthcare organisations probably have many tasks to do. However, they could reach the vulnerable citizens far better than the municipality could. At last, there was the problem of who the owner of the problem was, and which employees of the municipality were going to take this new task on them. The planning department has their belongings in the physical domain and the communication department has their belongings in the social domain. Furthermore, this was new territory. The data indicates that the privacy matter negatively affects the way the information about heat stress can be passed on. Otherwise, the citizens who are at risk but do not receive direct care and information about heat stress could be reached better. The data indicates that the obstacle of people being on summer vacation when it is summer could be tackled and could decrease when more technology is used, for example, by making the mailing lists automatic.

Communication with the ‘normal’ citizens

At first, the focus of the heatplan was on the vulnerable citizens. However, homeless people were not yet included. Furthermore, the municipality does not know whether the ‘normal’ citizens were informed well enough. When citizens do not have any form of daily but are

lonely, have heart problems, obesity or overall, bad health, they are included as the ‘normal’ citizens. However, the municipality is discussing options to put up posters and flyers at the general practitioners’ offices. Furthermore, they are thinking of combining maps of certain areas with each other to reach the vulnerable citizens better. Maps which entail the percentage of elderly people who are fragile and therefore more vulnerable with maps of houses that are badly isolated. Furthermore, maps where more lonely people live. This will create hotspots of communication targets. So far, the “normal” citizens were only contacted through social media by the municipality. Overall, more and more citizens are getting informed about heat stress and the consequences it has on vulnerable citizens through multiple organisations. The data indicates that the municipality has good ideas about how to reach citizens at risk for heat stress. Combining maps, for example, would be a step in the right direction. However, a commercial on television would be a good idea as well. Furthermore, almost any citizen goes to the supermarket, which makes it an efficient place to hang up posters about heat stress.

7.2. Influence indicators on effectiveness heatplan

Transferability and monitoring

The indicators of integrated governance, long-term viability, city budget, and transfer of actions do influence the transferability and monitoring of the heatplan. If they ever can become fully effective is unknown, because the heatplan is based on communicating through people. This makes it difficult to ensure the communication is being played out to the citizens the municipality wants to reach. The municipality only can evaluate and monitor a certain part of the process of the heatplan. However, the municipality thinks that when they would know more about the whole process the heatplan could improve even more. The transferability of the heatplan is being seen as efficient. The GGD and the municipality both believe that the heatplan of Utrecht could help other municipalities to develop a heatplan for themselves. Only the local parties would have to be different, and copy-paste is not the way to go, but it could help for sure. This data indicates that the transferability of the heatplan is rather efficient than not. With a lack of money, employees or even stagiaires to monitor and evaluate the heatplan, the data indicates that the heatplan is missing out on improving fast.

Citizens’ involvement

Some indicators of the respondents do correlate with their citizens’ involvement. However, the indicator implementation involvement does not correlate with the citizens’ involvement. The ownership and responsibility indicators do have correlations with their citizens’ involvement. Regarding whether the respondents used measures to prevent heat stress, whether the respondents consulted vulnerable citizens around them about what to do to prevent heat stress, and whether the respondents have taken measures for their pet(s) to prevent heat stress, do have correlations with the respondents their citizens’ involvement. The more they took measures, the more their citizens were involved. The adoption in the community indicator correlates with their citizens’ involvement. When the sharing on social media increases therefore does slightly their citizens’ involvement. The data indicates that the citizens of Utrecht are aware that actions and practising measures increase the citizens’ involvement in the heatplan. Likely the citizens’ participation in heat stress measures has something to do with the risks heat has on their health. Which makes it more urgent for citizens to do something about it.

Health and well-being

Some health and well-being indicators of the respondents do influence the health and well-being of the respondents. Regarding the indicator of physical health, there is no correlation with the effectiveness of the heatplan. However, with the mental health indicator, there was a correlation found. When the satisfaction mentally increases therefore does slightly their rating of their health and well-being. Whether the respondents are aware of the heat stress problems does not correlate with their health and well-being or the effectiveness of the heatplan. However, whether the respondents have access from their homes to places where there is cooling does have a significant with their health and well-being. When the number of meters to places with cooling is increasing (and the access is decreasing), their health and well-being decrease. There is a correlation between the impact heat stress has on respondents and their health and well-being. When the impact of heat stress on their life, work, and happiness increases, their health and well-being decrease. This data indicates that the lives of the citizens of Utrecht and their health and well-being are influenced by heat. The data indicates that this impact on the citizens has likely a connection with the citizens' involvement. Heat stress is increasing, and therefore are the health problems of the citizens in cities increasing and this likely stimulates the citizens' involvement to do something about it.

7.3. Effectiveness heatplan

Regarding the indicator transferability and monitoring (integrated governance, long-term viability, city budget, transfer of actions) of the heatplan of Utrecht it does influence the effectiveness of the heatplan. Furthermore, is this true for the indicator of citizens' involvement (ownership & responsibility and adoption in the community). When the effectiveness of the heatplan is rated higher, the respondents' citizens' involvement is higher and therefore do they think the influence of the citizens' involvement on the effectiveness is. The indicator health and well-being (mental health, impact, access) does influence the effectiveness of the heatplan. However, the respondents state that their health and well-being do not influence the effectiveness of the heatplan but do think that the health and well-being of the citizens do influence the effectiveness of the heatplan. When the effectiveness of the heatplan is rated higher, the respondents rate the influence of health and well-being on the effectiveness higher. The way the heatplan is implemented with its obstacles and the form of communication influences the effectiveness of the heatplan. The data indicates that the respondents and the interviewees found it difficult to rate the effectiveness. Many factors influence the effectiveness of the heatplan and with no efficient evaluation of the heatplan, the interviewees are missing information to decide on the effectiveness of the heatplan. As for the respondents, they have even less information on every factor that influences the effectiveness. Eventually, the data of rating the effectiveness indicates more their opinion of the effectiveness of the heatplan than the actual effectiveness.

Information given

The respondents state that when they have been given more often information about heat stress and received more messages, they have been informed more in general. However, whether they follow the municipality on social media or who it was that gave them the information does not influence how well the respondents have been informed about heat stress. How well the citizens of Utrecht have been informed does influence the effectiveness of the heatplan. When the effectiveness of the heatplan is higher, therefore is information given to the citizens on heat stress. The data indicates that informing the citizens of Utrecht is stimulating their rating of the effectiveness of the heatplan. Furthermore, is information often

on heat stress given through the newspaper and radio. However, they just mainly state that it is going to be hot and sometimes explain to drink enough water. However, the citizens need more information than that and that is why the municipality has an important role in informing more about what to do against heat stress.

Comparison of expert interviews and survey

Regarding the expert interviews, the creators rate the effectiveness of the heatplan at 3/3.5. However, they think it is hard to rate because many factors and organisations (radio, paper, etc.) play a role in communicating heat stress measures. The heatplan is difficult to monitor because nobody is obligated to spread information about heat stress. The process is easier evaluated than the effectiveness the creators of the heatplan believe. Regarding the survey, the effectiveness of the heatplan is rated on average estimated at 2.59. This means that the creators and the citizens of Utrecht do sort of rate the effectiveness of the heatplan in the same direction. Not considerably good, however not bad, just average.

7.4. Amended conceptual model

Regarding the results about which indicator the effectiveness of the heatplan influence, the following amended conceptual model emerges (see Figure. 4). What changed from Figure 3. is that now the indicators of physical health, awareness, and involvement implementation are not included in the model, because there is no correlation found with the effectiveness of the heatplan.

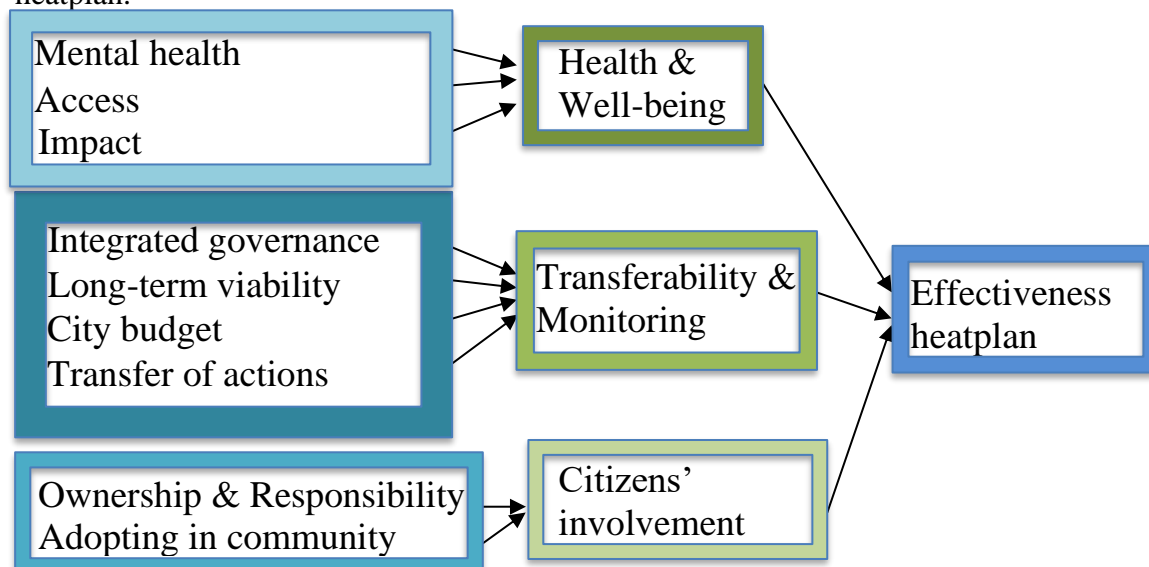


Figure 4. Amended Conceptual model

8. Conclusion

Sub-questions

How is the municipality of Utrecht implementing the heatplan?

The goal of the heatplan was to focus on developing the policy rather than implementing it perfectly. Local stakeholders were stimulated by the municipality of Utrecht to contribute to the development of the heatplan. The RIVM has a connection with the KNMI and will activate the National heatplan when needed. This activation will automatically activate the local heatplan. The municipality of Utrecht has contacts whom they email and have their own social media accounts where they post messages about preventing heat stress during hot periods. The municipality of Utrecht has more local organisations as contacts than the RIVM and GGD do for example. This makes heat stress being handled with a top-down and bottom-up approach.

What are the obstacles that the municipality of Utrecht is experiencing during the implementation of the heatplan?

There are a few obstacles. Many houses are badly isolated, and the house owners are difficult to reach. The heatplan usually is activated in the summer vacation period when many people are on vacation which makes it harder to monitor the heatplan. The municipality has a backup plan when people are on vacation but do other local organisations have that is still a question. Furthermore, all actions from other local organisations are not obligated. Due to privacy reasons, the municipality does not know who all vulnerable citizens are, which makes the target of communication more difficult. Healthcare organisations could reach vulnerable citizens far better than the municipality could.

To what extent is the municipality of Utrecht communicating the measures of the heatplan with the 'normal' citizens?

The focus of communication was vulnerable citizens. Furthermore, the municipality does not know yet if the "normal" citizens, who include citizens who do not have any form of daily but are lonely, have heart problems, obesity or overall, bad health, were informed well enough. So far, the "normal" citizens were only contacted through social media by the municipality. The municipality is thinking of options, for example, putting up posters at the general practitioners' offices. Furthermore, they are thinking of combining maps for more information about vulnerable citizens (who now are included in the normal citizen group). However, overall, more and more citizens are getting informed about heat stress and the consequences it has on vulnerable citizens through multiple organisations/channels.

Main research question

How effective is the implementation of the heatplan regarding the communication of heat stress measures with the not vulnerable citizens of Utrecht?

The creators of the heatplan think the effectiveness of the heatplan is 3/3.5 out of 5. Furthermore, the citizens of Utrecht would rate the effectiveness of the heatplan on average 2.59. The creators and the citizens of Utrecht do sort of rate the effectiveness of the heatplan regarding the communication with the not vulnerable citizens in the same direction. Not considerably good, however not bad. The creators do state that the effectiveness is hard to rate because many factors play a role in communicating heat stress measures. Regarding the

amended conceptual model, it shows how indicators influence the effectiveness of the heatplan. Furthermore, as said before, the implementation of the heatplan and its obstacles and communication measures do influence the effectiveness. Furthermore, at last, the information that is given on heat stress influences its effectiveness. If the information given is rated high, therefore is the effectiveness of the heatplan. This states that all these factors influence the effectiveness of the heatplan, which makes it difficult to rate the effectiveness itself. Especially for the respondents, and for the interviewees. Still, as the research entails the interviewees and respondents think the heatplan is halfway there to becoming more effective and giving more information on heat stress with better communication targets will play a big part.

8.1. Critical reflection

At first, regarding the respondents' profile of the survey, something catches the eye. The heatplan is all about communicating heat stress measures with the citizens of Utrecht. When the education is getting to a higher level, the effectiveness of the heatplan is getting lower. This can entail that when citizens are more educated, they will know better what to do about heat stress, which means that the heatplan is less effective. Which is logical thinking about the goal of the heatplan.

The "normal" citizens of Utrecht were not yet the focus of the heatplan. Furthermore, the "normal" citizen group still include many citizens with bad health. This means that the relevance of the research was more needed than thought. Furthermore, the "normal" citizen group were only contacted through social media. However, not all ages spend their time on social media and therefore there are not many options to try and connect to the citizens with bad health but do not receive direct healthcare.

My research was done after two years of implementing the heatplan of the municipality of Utrecht. This means that what exactly happened within those years is not evaluated. Only how the effectiveness of the heatplan is influenced and rated now.

The effectiveness of the heatplan of the municipality of Utrecht was hard to analyse. Because many factors and organisations (for example, the news and radio) play a part in communicating heat stress measures. The heatplan its communication measures are certainly not the only way. Furthermore, the results showed that by whom the information was given, did not influence the effectiveness of the heatplan. The heatplan is difficult to monitor because there is no obligation to spread the information. The process is easier evaluated than the effectiveness of the heatplan.

8.2. Recommendations

The heatplan is still a work in process and is evaluated every year. Upcoming year the municipality decided to focus on improving what the heatplan is already about instead of adding more. They have learned from their communication specialist that they already have a big reach of people on their social media. However, I would strongly advise adding the option of putting up posters at the general practitioners' offices to the heatplan. Furthermore, to get more information about communication targets by combining maps for more information about vulnerable citizens (who now are included in the normal citizen group). Then I believe the municipality is on a good path to improve the effectiveness of the heatplan even more. Furthermore, to include more vulnerable citizens in the communication target and their focus.

The municipality has contacted the local organisations because those structures of communication would improve the new structure of the heatplan on communication even more. However, I think that is important to shine a light on the structures that need to be built. Especially when there is no communication structure whatsoever for some vulnerable citizens who need to hear and see the heat stress measures. However, then I know that there are probably too few employees available in time from the municipality who could install these.

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10. Attachments

10.1. Time planning

Table 4. Planning

Data	What?	Remarks
10 March	Draft version Thesis Proposal	
20 March	Meeting on feedback proposal	
7 April	End version Thesis Proposal	
Week 17 (24-30 April)	Receiving feedback on proposal and processing feedback	
Week 18 (1-7 May)	Emailing interviewees & setting up interview guide qualitative research	
Week 19 (8-14 May)	Emailing interviewees & finishing the interview guide qualitative research	
Week 20 -22 (15 May-4 June)	Planning interviews & Developing transcripts	
Week 23 + 24 (5 June-18 June)	Analysing transcripts	On Atlas.ti
Week 25 + 26 (19 June-2 July)	Evaluating data	From Atlas.ti
Week 27 (3-9 July)	Setting up interview guide quantitative research	
Week 28 (10-16 July)	Finishing developing survey quantitative research	On Qualtrics
Week 36 (4-10 September)	Sending out the pilot version of the survey	On Qualtrics
Week 37 (11-17 September)	Sending out the end version of the survey	On Qualtrics
Week 38 (18-24 September)	Collecting data matrix	On Qualtrics
Week 39 + 40 (25 September-8 October)	Analysing data matrix	On SPSS
Week 41 (9-15 October)	Evaluating data	
Week 42 (16-22 October)	Developing discussion	
Week 43 (23-29 October)	Developing conclusion	

Week 44 (30 October-5 November)	Developing recommendations & reflections	
Week 45 + 46 (6 November-19 November)	Developing the summary and completing the Master Thesis	

10.2. Interview guides

10.2.1. Expert interviews

Message send on LinkedIn to creators of Heatplan

Dutch translation:

Geachte mevrouw *Gootzen/Hekhuis*,

Mijn naam is Eefje Janssen en ik studeer aan de Radboud Universiteit in Nijmegen. Ik ben bezig met mijn scriptie waarbij ik het hitteplan (van Gemeente Utrecht) dat u ontwikkeld heeft, analyseer. Dit wil ik doen door middel van een survey. Maar voordat ik deze ga ontwikkelen, zou ik u graag tien minuten of langer willen interviewen zodat ik niks over het hoofd zie. Mijn vraag is dus of u hieraan zou willen meewerken? Ik ben ook bereid om een korte vragenlijst op te sturen zodat u die kan invullen wanneer u tijd heeft. Als u mij wilt bereiken via mijn email, dan kan dat met het emailadres: eefje.janssen@ru.nl

Met vriendelijke groet,
Eefje Janssen

Message send on LinkedIn to employee GGD Utrecht

Geachte mevrouw Sluis,

Mijn naam is Eefje Janssen en ik studeer aan de Radboud Universiteit in Nijmegen. Ik ben bezig met mijn scriptie waarbij ik het hitteplan van Utrecht analyseer. Hierbij heb ik de twee personen die het hitteplan hebben ontwikkeld al gesproken, maar als ik het goed begrepen heb, stimuleert u ook anderen gemeentes om een hitteplan te ontwikkelen. Ik vroeg me af of ik u daarover ongeveer 15 minuten een paar vragen mocht stellen. Ik ben ook bereid om de vragen op te sturen zodat u die zelf in uw eigen tijd zou kunnen beantwoorden. Als u mij wilt bereiken via email kan dat op het volgende adres: eefje.janssen@ru.nl

Met vriendelijke groet,
Eefje Janssen

Email send for interviewees to climate sector municipality Utrecht

Dutch translation:

Geachte,

Mijn naam is Eefje Janssen en ik studeer aan de Radboud Universiteit in Nijmegen. Ik ben bezig met mijn scriptie waarbij ik het hitteplan van Gemeente Utrecht analyseer. Dit wil ik

doen door middel van een survey. Maar voordat ik deze ga ontwikkelen, zou ik graag tien minuten of langer personen die binnen de gemeente Utrecht over hittestress, klimaatadaptatie en/of communicatie gaan, interviewen. Dit zodat ik niks over het hoofd zie wat betreft de survey-vragen. Mijn vraag is dus of u hieraan zou willen meewerken? Ik ben ook bereid om een korte vragenlijst op te sturen zodat personen die kunnen invullen wanneer zij tijd hebben.

Met vriendelijke groet,
Eefje Janssen

Message send on LinkedIn to employee RIVM National Heatplan

Geachte meneer Hagens,

Mijn naam is Eefje Janssen en ik studeer aan de Radboud Universiteit in Nijmegen. Ik ben bezig met mijn scriptie waarbij ik het hitteplan van Utrecht analyseer. Hierbij heb ik de twee personen die het hitteplan hebben ontwikkeld al gesproken en als ik het goed begrepen heb, weet u ook veel van hitte in de stad en de communicatie daarover. Mijn focus ligt op de communicatie met de gewone burgers van de gemeente. Ik vroeg me af of ik u daarover ongeveer 15 minuten een paar vragen mocht stellen. Ik ben ook bereid om de vragen op te sturen zodat u die zelf in uw eigen tijd zou kunnen beantwoorden. Als u mij wilt bereiken via email kan dat op het volgende adres: eefje.janssen@ru.nl

Met vriendelijke groet,
Eefje Janssen

Questionnaire Expert interviews

Introduction

So, the subject of my thesis is the heatplan of the municipality of Utrecht. As you know, the heatplan of the municipality of Utrecht is about communicating heat stress measures with three target groups. The aim of this research is to analyse the effectiveness of the heatplan focused on communicating heat stress measures with the citizens that are not placed in the vulnerable group. This is done by conducting a survey, but to correctly develop this these expert-interviews are being held. The questions in this interview will focus on better understanding the heat plan, its transferability and monitoring as well as its effectiveness.

Question's Part 1 (Transferability & Monitoring)

(Integration governance)

1. In what way is the municipality of Utrecht implementing the heat plan so far? Think for instance about whether the heat plan has already been used and what results came forward.
2. To what extent does the municipality of Utrecht experience obstacles in implementing the heat plan?
3. To what extent and how does the municipality of Utrecht communicate the measures of the heat plan to citizens who do not fall under the vulnerable group? In the heatplan

it is described as through social media channels of the municipality of Utrecht and neighbourhood newsletters, but on communicating with the other target groups there are broader explanations, so that is why I'm curious for more.

Section 6 of the heat plan describes the division of tasks of five stakeholders regarding the planning and implementation of the heat plan.

4. To what extent do you feel these five stakeholders have been involved in the planning and implementation of the heat plan in 2022? Given the experience of 2022, do you think there is still room for improvement in the way these stakeholders are involved and cooperating in the implementation of the heat plan?
5. How is the cooperation from the Municipality of Utrecht with the other four stakeholders (GGD, Red Cross, GHOR and Animal Protection) perceived by the municipality according to you?

(Long-term viability)

6. To what extent are the vigilance phase, pre-warning phase and warning phase that result in the timing of the heatplan, perceived sufficient by the municipality according to you?
7. What are financial aspects of implementing the heat plan and to what extent do they affect the viability?
8. To what extent is the monitoring of the heat plan experienced by the municipality as sufficient according to you? Consider, for example, whether monitoring is also encouraged and how long it takes to monitor the heat plan.

(City budget)

9. To what extent is the budget for planning, implementation, maintenance, and monitoring in terms of climate change policy according to you sufficient?

(Transfer of actions)

10. To what extent are actions like planning, implementing, maintaining, and monitoring taken place and which ones according to you?

Questions Part 2 (Effectiveness)

11. On a scale of one to five (increasing), how would you rate the transferability of the heat plan? Transferability meaning how well the heatplan is transferred to reality taking into consideration the obstacles, stakeholders' cooperation, timing, viability, budget, and actions that have been developed. Why did you give this score?
12. On a scale of one to five (increasing), how much does transferability affect the effectiveness of the heat plan? Why did you give this score?

13. On a scale of one to five (increasing), how would you rate the effectiveness of the heat plan? Why did you give this score?

This was the end of the interview. Do you maybe know other people who could be useful to interview for my thesis? Thank you for your time.

Dutch translation:

Introductie

Het onderwerp van mijn scriptie is dus het hitteplan van de gemeente Utrecht. Zoals u weet gaat het hitteplan van de gemeente Utrecht over het communiceren van hittestressmaatregelen met drie doelgroepen. Het doel van dit onderzoek is het analyseren van de effectiviteit van het hitteplan en met nadruk het communiceren van hittestressmaatregelen met de burgers die niet onder de kwetsbare groep worden geplaatst. Dit zal gebeuren door middel van een enquête, maar om dit goed uit te werken worden eerst deze interviews gehouden. De vragen in dit interview zullen gericht zijn op het krijgen van een beter begrip van het hitteplan. En op de overdraagbaarheid, monitoring én effectiviteit van het hitteplan.

Vragen Deel 1 (Overdraagbaarheid & Monitoring)

(Integratie governance)

1. Op welke wijze voert de gemeente Utrecht tot nu toe het hitteplan uit? Denk bijvoorbeeld aan of het hitteplan al in werking is geweest en welke resultaten daar naar voren zijn gekomen.

2. In hoeverre ervaart de gemeente Utrecht belemmeringen bij de uitvoering van het hitteplan?

3. In hoeverre en hoe communiceert de gemeente Utrecht de maatregelen van het hitteplan naar burgers die niet tot de kwetsbare groep behoren? In het hitteplan wordt het omschreven als via social-mediakanalen van de gemeente Utrecht en wijknieuwsbrieven, maar over communicatie met de andere doelgroepen wordt bredere uitleg gegeven, dus vandaar dat ik nieuwsgierig ben naar meer.

Hoofdstuk 6 van het hitteplan beschrijft de taakverdeling van vijf stakeholders met betrekking tot de planning en uitvoering van het hitteplan.

4. In welke mate zijn deze vijf stakeholders volgens u betrokken bij de planning en uitvoering van het hitteplan in 2022? Denkt u, gezien de ervaring van 2022, dat er nog ruimte is voor verbetering in de manier waarop deze stakeholders worden betrokken en samenwerken bij de uitvoering van het hitteplan?

5. Hoe wordt de samenwerking vanuit de gemeente Utrecht met de overige vier stakeholders (GGD, Rode Kruis, GHOR en Dierenbescherming) door de gemeente ervaren volgens u?

(Levensvatbaarheid op lange termijn)

6. In hoeverre worden de waakzaamheidsfase, voorwaarschuwingfase en waarschuwingfase, oftewel de timing, van het hitteplan door de gemeente als voldoende ervaren volgens u?

7. Wat zijn financiële aspecten van het implementeren van het hitteplan en in hoeverre beïnvloeden deze de uitvoering van het hitteplan? Is er genoeg geld voor de komende jaren?

8. In hoeverre wordt de monitoring van het hitteplan door de gemeente als voldoende ervaren volgens u? Denk bijvoorbeeld aan of het monitoren wordt aangemoedigd en hoelang het duurt om het hitteplan te monitoren.

(Stadsbegroting)

9. In hoeverre is het budget voor planning, uitvoering, onderhoud en monitoring voor het hitteplan volgens u voldoende?

(Acties)

10. In welke mate vinden acties wat betreft planning, implementatie, onderhoud en monitoring plaats en welke volgens u? Is er genoeg actie ondernomen om het hitteplan tot werkelijkheid te brengen?

Vragen Deel 2 (Effectiviteit)

11. Hoe beoordeelt u op een schaal van één tot vijf (oplopend) de overdraagbaarheid en monitoring van het hitteplan? Overdraagbaarheid bedoelt alsin hoe goed het hitteplan wordt overgedragen naar de realiteit en andere steden. Is het hitteplan efficiënt genoeg o, ergens anders geïmplementeerd te worden? Waarom heeft u deze score gegeven?

12. Op een schaal van één tot vijf (oplopend), hoeveel invloed hebben de overdraagbaarheid en monitoring op de effectiviteit van het hitteplan? Waarom heeft u deze score gegeven?

13. Hoe beoordeelt u op een schaal van één tot vijf (oplopend) de effectiviteit van het hitteplan? Dit is in hoeverre de gemeente hierbij kan bijdragen door middel van contacten en social media bijvoorbeeld. Werkt het plan zoals het is of zouden er dingen toegevoegd of geschrapt moeten worden? Waarom heeft u deze score gegeven?

Dit was het einde van het interview. Kent u misschien andere mensen die nuttig kunnen zijn om te interviewen voor mijn scriptie? Bedankt voor uw tijd.

After the first interview

The data collected from the first interview is helpful for the second, the second for the third and the third for the fourth. So, other questions are developed after the interviews before.

Questions for Jeanet Hekhuis, creator Heatplan:

Dutch translation:

Mijn focus van mijn onderzoek ligt op de niet kwetsbare gewone groep burgers van Utrecht en hoe zij gecontacteerd worden door middel van het hitteplan. Ik heb Jeanne hier al het een en ander over gevraagd maar er waren nog een paar vragen overgebleven of onduidelijk die ik graag zou willen bespreken.

1. Jeanne Gootzen vertelde me dat jij mij meer kon vertellen over mensen die wonen in slecht geïsoleerde huizen. Deze mensen vallen dus eigenlijk niet in de kwetsbare groep zoals beschreven in het hitteplan, maar zijn dus eigenlijk wel kwetsbaar voor de hitte tijdens een hittegolf als ik het goed begrijp? Hoe proberen jullie die groep te bereiken? Valt dit onder het hitteplan of is dit beschreven in een ander beleid?
2. Denk je dat er nog andere groepen bewoners zijn van Utrecht die niet in die kwetsbare groep vallen, maar wel kwetsbaar zijn? Hoe worden die bereikt?
3. De effectiviteit van het hitteplan is moeilijk te meten aangezien meerdere organisaties enzovoorts kunnen bijdragen aan de communicatie over hitte stres-maatregelen. Maar in hoeverre zou je de effectiviteit van het hitteplan schalen wat betreft of alle aspecten van het plan effectief zijn of dat er nog aspecten missen?
4. In hoeverre zou u zeggen dat de overdraagbaarheid van het hitteplan naar een andere stad en de monitoring ervan, bijdraagt aan de effectiviteit van het plan?

Questions for Nienke Sluis, GGD Utrecht:

Dutch translation:

U werkt bij de GGD Utrecht die ook een rol speelt in het hitteplan van de gemeente Utrecht en als ik het goed heb stimuleert u ook andere gemeentes om een hitteplan te ontwikkelen. Daarover wil ik een paar vragen stellen.

1. In hoeverre heeft de GGD Utrecht volgens u aan de ontwikkeling, planning en uitvoering van het hitteplan bijgedragen?
2. In hoeverre heeft de GGD Utrecht samengewerkt met de Gemeente Utrecht wat betreft het hitteplan?
3. In hoeverre bent u bezig om andere gemeentes te stimuleren een hitteplan te ontwikkelen?
4. In hoeverre zouden andere gemeentes een hitteplan kunnen ontwikkelen met als voorbeeld die van Utrecht? Hoe zou u de overdraagbaarheid van het hitteplan naar een andere stad schalen?
5. Wat zijn belemmeringen bij het stimuleren van andere gemeentes om een hitteplan te ontwikkelen?
6. In hoeverre zou u de effectiviteit van het hitteplan schalen? Wat betreft of alle aspecten van het plan effectief zijn of dat er nog aspecten missen.

Questions for Werner Hagens, RIVM National Heatplan:

Dutch translation:

U werkt bij het RIVM waarbij u zich onder andere bezighoudt met het Nationaal Hitteplan en als ik het goed heb speelt u een rol bij de communicatie met de algemene bevolking. Daarover zou ik een paar vragen willen stellen.

-In hoeverre denkt u dat het hitteplan van Utrecht bijdraagt aan het Nationaal hitteplan wat betreft de communicatie met de algemene bevolking over hittestress maatregelen? Wat zijn hier de overeenkomsten en welke aspecten ondersteunen en stimuleren elkaar wat betreft het Nationaal hitteplan?

-In hoeverre zou u de effectiviteit van het hitteplan schalen wat betreft de communicatie met de algemene bevolking? Wat betreft of die aspecten van het plan effectief zijn of dat er nog aspecten missen. Hoe zou de communicatie met de algemene bevolking volgens het hitteplan van Utrecht verbeterd kunnen worden volgens u?

10.2.2. Survey

Message send on WhatsApp, Facebook-groups, email, and Next Door with survey

Dutch translation:

Lieve mensen,

Mijn naam is Eefje Janssen en ik studeer aan de Radboud Universiteit in Nijmegen. Ik ben bezig met mijn scriptie waarbij ik de effectiviteit van het hitteplan van de Gemeente Utrecht analyseer. Dit wil ik doen door middel van een survey. Daarom wil ik graag de inwoners van de Gemeente Utrecht die **geen** constante zorg (bijvoorbeeld thuiszorg of in een verzorgingstehuis) ontvangen **en/of niet** eigenaar zijn van een bedrijf met dieren, vragen om deze vragenlijst in te vullen. De vragenlijst is anoniem, bevat 26 vragen en neemt ongeveer 8 minuten in beslag. Ook zou ik het waarderen als u de vragenlijst zou kunnen delen met uw familie, kennissen, burens en andere personen die binnen de doelgroep vallen.

https://fmru.az1.qualtrics.com/jfe/form/SV_e2JjS00wHFHvafA

Questionnaire survey

Introduction

Dear reader,

The Municipality of Utrecht has developed a heatplan, to inform three groups when a hot period occurs what to do to prevent heat stress for themselves and others. Heat stress is a physical condition that can arise when the body overheats, which can even lead to the death of a person. The three groups are vulnerable citizens, companies with farm animals and 'normal' citizens. This survey will focus on the 'normal' group of citizens of the Municipality of Utrecht, to test whether the heat plan is effective in this group.

By filling in this survey you give permission to the researcher to use your answers in the research on the heatplan of the Municipality of Utrecht.

Questions part 1 (Respondent profile)

1. Are you a resident of the Municipality of Utrecht?

-Yes

-No (Then the survey ends here)

2. Do you receive direct assistance from healthcare institutions (such as home care or weekly GP visits) or do you have a company that keeps farm animals?

-Yes (Then the survey ends here)

-No

3. What is your age?

-18-29 years

-30-39 years

-40-49 years

-50-59 years

-60+ years

4. What is your gender?

-Female

-Male

-Other

5. What is the highest level of education that you have completed or are working on?

-Secondary school

-MBO

-HBO

-WO bachelor

-WO master

Questions part 2 (Citizen involvement)

(Implementation involvement)

6. To what extent do you know what to do to prevent heat stress in yourself? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.

1-I don't know what I can do to prevent heat stress.

2-I know a little (only one measure) about what I should do to prevent heat stress.

3-I know enough (at least two measures) about what I should do to prevent heat stress.

4-I know more than enough (at least three measures) about what I should do to prevent heat stress.

5-I know a lot (at least four measures) about what I should do to prevent heat stress.

7. To what extent do you know what to do to prevent heat stress among vulnerable people around you and your pets? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.

1-I am not aware of what to do to avoid heat stress in vulnerable persons or pets around me.

2- I am somewhat aware (only one measure) of what to do to prevent heat stress in vulnerable people or pets around me.

- 3- I am sufficiently aware (at least two measures) of what I must do to prevent heat stress in vulnerable people or pets around me.
- 4- I am more than sufficiently aware (at least three measures) of what I must do to prevent heat stress in vulnerable people or pets around me.
- 5- I am very aware (at least four measures) of what I must do to prevent heat stress in vulnerable people or pets around me.

(Ownership & Responsibility)

8. During the hot periods in the past two years, to what extent did you use the following measures to prevent heat stress: hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.

- 1-I do not use any measures.
- 2-I use one measure.
- 3-I use two measures.
- 4-I use three measures.
- 5-I use four or more measures.

9. To what extent have you consulted vulnerable people around you during a hot period the past two years about what to do to prevent heat stress? Think of measures such as hydrating, staying in the shade, not doing physical hard work, finding cold places and where there are facilities for cooling and so on.

- 1-I don't have vulnerable people around me.
- 2-I have not consulted vulnerable people around me.
- 3-I consulted vulnerable people around me about one measure.
- 4-I consulted vulnerable people around me about two measures.
- 5-I consulted vulnerable people around me about three measures.
- 6-I consulted vulnerable people around me about four or more measures.

10. To what extent have you taken measures for your pet(s) during a hot period the past two years to prevent heat stress? Think of measures such as hydrating, staying in the shade, not doing physically hard work (such as taking long walks), finding cold places and where there are facilities for cooling and so on.

- 1-I have no pet
- 2-I did not use the measures for my pet.
- 3-I used one measure for my pet.
- 4-I used two measures for my pet.
- 5-I used three measures for my pet.
- 6-I used four or more measures for my pet.

(Adopting in the community)

11. To what extent do you share with others on your social media during a hot period the past two years what to do to prevent heat stress? Think of Facebook, Twitter, and Instagram.

- 1-I do not share anything on social media about measures to prevent heat stress during a hot period.
- 2-I will share something on social media about measures to prevent heat stress during a hot period.
- 3- I share twice on social media about measures to prevent heat stress during a hot period.

4-I shared three times on social media about measures to prevent heat stress during a hot period.

5-I share several times on social media about measures to prevent heat stress during a hot period.

Questions part 3 (Health & Well-being)

(Physical & Mental)

12. To what extent do you participate in outdoor activities? Think of a round of walking/cycling or doing sports.

1-I do not participate in outdoor activities.

2-I participate in outdoor activities once or twice a week.

3-I participate in outdoor activities three or four times a week.

4-I participate in outdoor activities five or six times a week.

5-I participate in outdoor activities every day.

13. To what extent are you mentally satisfied?

1-I am very dissatisfied.

2-I am a little mentally dissatisfied.

3-I am neutral.

4-I am quite satisfied.

5-I am very satisfied.

(Access & Awareness)

14. To what extent do you have access from your home to places where there is cooling (such as a park, square with many trees/water or a forest)?

1-Less than 200 meters.

2-Between 200 and 500 meters.

3-Between 501 meters and 750 meters.

4-Between 751 and 1000 meters.

5-More than 1 km.

15. To what extent are you aware of the heat stress problems and consequences? Think of problems/consequences such as difficulty with concentrating or sleeping, getting headaches faster, becoming aggressive, tired, or dizzy faster, being less alert or productive, dehydration, overheating, heart failure, possibility of dying earlier, more hospital visits and therefore overloading the healthcare organisations.

1-I am not aware of the problems/consequences of heat stress.

2-I am aware of at least one or two problems/consequences of heat stress.

3-I am aware of at least three or four problems/consequences of heat stress.

4-I am aware of at least five or six problems/consequences of heat stress.

5-I am aware of at least seven problems/consequences of heat stress.

(Impact)

16. To what extent does the risk of heat stress negatively affect your quality of life, work, and happiness?

1-Heat stress has no impact on my quality of life, work, and happiness.

- 2-Heat stress has some impact on my quality of life, work, and happiness.
- 3-Heat stress has enough impact on my quality of life, work, and happiness.
- 4-Heat stress has more than enough impact on my quality of life, work, and happiness.
- 5-Heat stress has a lot of impact on my quality of life, work, and happiness.

Questions part 4 (Effectiveness)

17. How often have you been informed about what to do during a hot period to prevent heat stress with yourself, others, and animals the past two years?

- 1-I have not been informed.
- 2-I have seen/read one post about this.
- 3-I have seen/read two posts about this.
- 4-I have seen/read three posts about this.
- 5-I have seen/read four or more posts about this.

18. How many of these messages came from the Municipality of Utrecht?

- 1-No messages
- 2-One message
- 3-Two messages
- 4-Three messages
- 5-Four or more messages

19. Who wrote the other messages in which you were informed about what to do during a hot period to prevent heat stress in yourself, others, and animals the past two years? Multiple options are possible.

- 1-From no one else
- 2-RIVM
- 3-GGD Utrecht
- 4-News channels such as the newspaper/radio
- 5-Other

20. Do you have the idea that you have been informed enough about what to do during a hot period to prevent heat stress in yourself, others, and animals the past two years?

- 1-Not at all
- 2-A little
- 3-Enough
- 4-More than enough
- 5-Very much

21. Do you follow the account of the Municipality of Utrecht on Twitter, Facebook, or Instagram?

- 1-Yes
- 2-No

22. On a scale from one to five (where 1 is the lowest and 5 is the highest), how would you rate your involvement in the heat plan? Think of taking measures against heat stress or informing others.

- 1-2-3-4-5

23. On a scale of one to five, how much do you your involvement influences the effectiveness of the heat plan? Here 1 is: Involvement does not influence effectiveness. And 5: Involvement greatly influences effectiveness.

1-2-3-4-5

24. On a scale of one to five (where 1 is the lowest and 5 is the highest), how would you rate your health and well-being? Think of your overall health and your awareness of the consequences and impact of heat stress on your body.

1-2-3-4-5

25. On a scale of one to five, how much do you think your health and well-being influences the effectiveness of the heat plan? Here is 1: Health and well-being does not influence effectiveness. And 5: Health and well-being greatly influence effectiveness.

1-2-3-4-5

26. On a scale of one to five (where 1 is the lowest and 5 is the highest), how would you rate the effectiveness of the heat plan?

1-2-3-4-5

If you want to comment something, that is possible in the next text box.

[]

This was the end of the questionnaire. Thanks for your time.

Dutch translation:

Introductie

Beste lezer,

De Gemeente Utrecht heeft een hitteplan ontwikkeld, om drie soorten groepen tijdens een hete periode te informeren om zo hittestress te voorkomen bij henzelf en anderen. Hittestress is een lichamelijke aandoening die kan ontstaan wanneer het lichaam oververhit raakt, wat zelfs kan leiden tot het overlijden van een persoon. De drie groepen betreffen de kwetsbare burgers, bedrijven met landbouwdieren en de ‘normale’ burgers. Dit onderzoek zal focussen op de ‘normale’ groep bewoners van de Gemeente Utrecht, waarbij getest wordt of het hitteplan effectief is voor deze groep.

Door deze vragenlijst in te vullen, geeft u toestemming dat uw antwoorden zullen gebruikt worden in dit onderzoek over het hitteplan van de Gemeente Utrecht.

Vragen deel 1 (Respondent profiel)

1. Bent u een bewoner van de Gemeente Utrecht?

-Ja

-Nee (dan eindigt hier de vragenlijst)

2. Ontvangt u directe hulp van zorginstellingen (zoals bijvoorbeeld thuiszorg of wekelijkse huisartsbezoeken) of heeft u een bedrijf dat boerderijdieren houdt?

-Ja (dan eindigt hier de vragenlijst)

-Nee

3. Wat is uw leeftijd?

-18-29 jaar

-30-39 jaar

-40-49 jaar

-50-59 jaar

-60+ jaar

4. Wat is uw geslacht?

-Vrouw

-Man

-Anders

5. Wat is de hoogste opleiding die u heeft afgerond of mee bezig bent?

-Middelbare school

-MBO

-HBO

-WO bachelor

-WO master

Vragen deel 2 (Burger betrokkenheid)

(Implementatie betrokkenheid)

6. In hoeverre weet u wat te doen om hittestress te voorkomen bij uzelf? Denk hierbij aan maatregelen zoals hydrateren, in de schaduw blijven, niet fysiek hard werk verrichten, koude plekken vinden en waar faciliteiten zijn voor verkoeling enzovoorts.

1-Ik weet niet wat ik kan doen om hittestress te voorkomen.

2-Ik weet een beetje (minstens één maatregel) wat ik zou moeten doen om hittestress te voorkomen.

3-Ik weet voldoende (minstens twee maatregelen) wat ik zou moeten doen om hittestress te voorkomen.

4-Ik weet meer dan voldoende (minstens drie maatregelen) wat ik zou moeten doen om hittestress te voorkomen.

5-Ik weet veel (minstens vier maatregelen) over wat ik zou moeten doen om hittestress te voorkomen.

7. In hoeverre weet u wat te doen om hittestress te voorkomen bij kwetsbare personen om u heen en uw huisdieren? Denk hierbij aan maatregelen zoals hydrateren, in de schaduw blijven, niet fysiek hard werk verrichten, koude plekken vinden en waar faciliteiten zijn voor verkoeling enzovoorts.

1-Ik ben me er niet bewust van wat ik moet doen om hittestress te voorkomen bij kwetsbare personen of huisdieren om mij heen.

2- Ik ben me er een beetje (minstens één maatregel) bewust van wat ik moet doen om hittestress te voorkomen bij kwetsbare personen of huisdieren om mij heen.

3- Ik ben me er voldoende (minstens twee maatregelen) bewust van wat ik moet doen om hittestress te voorkomen bij kwetsbare personen of huisdieren om mij heen.

4- Ik ben me er meer dan voldoende (minstens drie maatregelen) bewust van wat ik moet doen om hittestress te voorkomen bij kwetsbare personen of huisdieren om mij heen.

5- Ik ben me er erg bewust (minstens vier maatregelen) van wat ik moet doen om hittestress te voorkomen bij kwetsbare personen of huisdieren om mij heen.

(Eigen maken & Verantwoordelijkheid)

8. In hoeverre heeft u tijdens de hete periodes in de afgelopen twee jaar gebruik gemaakt van de volgende maatregelen die u kunt nemen om hittestress te voorkomen: hydrateren, in de schaduw blijven, niet fysiek hard werk verrichten, koude plekken vinden en waar faciliteiten zijn voor verkoeling enzovoorts.

1-Ik heb niet gebruik gemaakt van de maatregelen.

2-Ik heb gebruik gemaakt van één maatregel.

3-Ik heb gebruik gemaakt van twee maatregelen.

4-Ik heb gebruik gemaakt van drie maatregelen.

5-Ik heb gebruik gemaakt van vier of meer maatregelen.

9. In hoeverre heeft u tijdens de hete periodes in de afgelopen twee jaar kwetsbare personen om u heen geadviseerd wat te doen om hittestress te voorkomen? Denk hierbij aan maatregelen zoals hydrateren, in de schaduw blijven, niet fysiek hard werk verrichten, koude plekken vinden en waar faciliteiten zijn voor verkoeling enzovoorts.

1-Ik heb geen kwetsbare personen om mij heen.

2-Ik heb kwetsbare personen om mij heen niet geadviseerd.

3-Ik heb kwetsbare personen om mij heen geadviseerd over één maatregel.

4-Ik heb kwetsbare personen om mij heen geadviseerd over twee maatregelen.

5-Ik heb kwetsbare personen om mij heen geadviseerd over drie maatregelen.

6-Ik heb kwetsbare personen om mij heen geadviseerd over vier of meer maatregelen.

10. In hoeverre heeft u tijdens de hete periodes in de afgelopen twee jaar maatregelen getroffen bij uw huisdier(en) om hittestress te voorkomen? Denk hierbij aan maatregelen zoals hydrateren, in de schaduw blijven, niet fysiek hard werk verrichten (zoals lange wandelingen maken), koude plekken vinden en waar faciliteiten zijn voor verkoeling enzovoorts.

1-Ik heb geen huisdier.

2-Ik heb geen gebruik gemaakt van de maatregelen voor mijn huisdier.

3-Ik heb gebruik gemaakt van één maatregel voor mijn huisdier.

4-Ik heb gebruik gemaakt van twee maatregelen voor mijn huisdier.

5-Ik heb gebruik gemaakt van drie maatregelen voor mijn huisdier.

6-Ik heb gebruik gemaakt van vier of meer maatregelen voor mijn huisdier.

(Opnemen in gemeenschap)

11. In hoeverre deelt u tijdens de hete periodes in de afgelopen twee jaar op uw Social media met anderen mensen wat te doen om hittestress te voorkomen? Denk hierbij aan Facebook, Twitter en Instagram.

1-Ik heb niks gedeeld op Social media over maatregelen om hittestress te voorkomen tijdens een hete periode.

2-Ik heb één keer wat gedeeld op Social media over maatregelen om hittestress te voorkomen tijdens een hete periode.

- 3- Ik heb twee keer wat gedeeld op Social media over maatregelen om hittestress te voorkomen tijdens een hete periode.
- 4-Ik heb drie keer wat gedeeld op Social media over maatregelen om hittestress te voorkomen tijdens een hete periode.
- 5-Ik heb meerdere keren wat gedeeld op Social media over maatregelen om hittestress te voorkomen tijdens een hete periode.

Vragen deel 3 (Gezondheid & Welzijn)

(Fysiek & Mentaal)

12. In hoeverre participeert u in buitenactiviteiten? Denk hierbij aan een rondje wandelen/fietsen of sporten.
- 1-Ik participeer niet in buitenactiviteiten.
 - 2-Ik participeer één of twee keer per week in buitenactiviteiten.
 - 3-Ik participeer drie of vier keer per week in buitenactiviteiten.
 - 4-Ik participeer vijf of zes keer per week in buitenactiviteiten.
 - 5-Ik participeer elke dag in buitenactiviteiten.
13. In hoeverre bent u mentaal tevreden?
- 1-Ik ben zeer ontevreden.
 - 2-Ik ben een beetje mentaal ontevreden.
 - 3-Ik ben neutraal.
 - 4-Ik ben redelijk tevreden.
 - 5-Ik ben zeer tevreden.

(Bereik & Bewustzijn)

14. In hoeverre heeft u bereik vanaf uw huis tot plekken waar verkoeling is (zoals een park, plein met veel bomen/water of bos)?
- 1-Minder dan 200 meter.
 - 2-Tussen de 200 en 500 meter.
 - 3-Tussen de 501 meter en 750 meter.
 - 4-Tussen de 751 en 1000 meter.
 - 5-Meer dan 1 km.
15. In hoeverre bent u zich bewust problemen en gevolgen van hittestress? Denk hierbij aan problemen/gevolgen zoals moeilijker concentreren of slapen, sneller hoofdpijn krijgen, sneller agressief, moe of duizelig worden, minder alert of productief zijn, uitdroging, oververhitting, hartfalen, het eerder te kunnen komen overlijden, meer ziekenhuisbezoeken én daardoor ook overbelasting van de zorg.
- 1-Ik ben mij niet bewust van de problemen/gevolgen rondom hittestress.
 - 2-Ik ben mij bewust van minstens één of twee problemen/gevolgen rondom hittestress.
 - 3-Ik ben mij bewust van minstens drie of vier problemen/gevolgen rondom hittestress.
 - 4-Ik ben mij bewust van minstens vijf of zes problemen/gevolgen rondom hittestress.
 - 5-Ik ben mij bewust van minstens zeven problemen/gevolgen rondom hittestress.

(Impact)

16. In hoeverre heeft het risico op hittestress negatieve impact op uw levenskwaliteit, werk en geluk?
- 1-Hittestress heeft geen impact op mijn levenskwaliteit, werk of geluk.
 - 2-Hittestress heeft een beetje impact op mijn levenskwaliteit, werk of geluk.
 - 3-Hittestress heeft voldoende impact op mijn levenskwaliteit, werk of geluk.
 - 4-Hittestress heeft meer dan voldoende impact op mijn levenskwaliteit, werk of geluk.
 - 5-Hittestress heeft veel impact op mijn levenskwaliteit, werk of geluk.

Vragen deel 4 (Effectiviteit)

17. Hoe vaak bent u de afgelopen twee jaar geïnformeerd over wat te doen tijdens een hete periode om hittestress bij uzelf, anderen en dieren te voorkomen?
- 1-Ik ben niet geïnformeerd.
 - 2-Ik heb één bericht hierover gezien/gelezen.
 - 3-Ik heb hier twee berichten over gezien/gelezen.
 - 4-Ik heb hier drie berichten over gezien/gelezen.
 - 5-Ik heb hier vier of meer berichten over gezien/gelezen.
18. Hoeveel berichten hiervan waren afkomstig van de Gemeente Utrecht?
- 1-Geen berichten
 - 2-Één bericht
 - 3-Twee berichten
 - 4-Drie berichten
 - 5-Vier of meer berichten
19. Van wie waren de andere berichten waarin u bent geïnformeerd over wat te doen tijdens een hete periode om hittestress bij uzelf, anderen en dieren te voorkomen de afgelopen twee jaar? Meerdere opties zijn mogelijk.
- 1-Van niemand anders
 - 2-RIVM
 - 3-GGD Utrecht
 - 4-Nieuwskanalen zoals de krant/radio
 - 5-Andere
20. Heeft u de afgelopen twee jaar het idee dat u genoeg bent geïnformeerd over wat te doen tijdens een hete periode om hittestress bij uzelf, anderen en dieren te voorkomen?
- 1-Helemaal niet
 - 2-Een beetje
 - 3-Genoeg
 - 4-Meer dan genoeg
 - 5-Erg veel
21. Volgt u op Twitter, Facebook of Instagram het account van de Gemeente Utrecht?
- 1-Ja
 - 2-Nee
22. Op een schaal van een tot vijf (waarbij 1 het laagst en 5 het hoogst is), hoe zou u uw betrokkenheid van het hitteplan beoordelen? Denk hierbij aan maatregelen nemen tegen hittestress en anderen informeren.

1-2-3-4-5

23. Op een schaal van een tot vijf, hoeveel beïnvloedt uw betrokkenheid volgens u de effectiviteit van het hitteplan? Hierbij is 1: De betrokkenheid beïnvloedt niet de effectiviteit. En 5: De betrokkenheid beïnvloedt de effectiviteit heel erg.

1-2-3-4-5

24. Op een schaal van een tot vijf (waarbij 1 het laagst en 5 het hoogst is), hoe zou u uw gezondheid en welzijn beoordelen? Denk hierbij aan uw algemene gezondheid en uw bewustzijn van de gevolgen en impact van hittestress op uw lichaam.

1-2-3-4-5

25. Op een schaal van een tot vijf, hoeveel beïnvloedt uw gezondheid en welzijn volgens u de effectiviteit van het hitteplan? Hierbij is 1: Gezondheid en welzijn beïnvloedt niet de effectiviteit. En 5: Gezondheid en welzijn beïnvloedt de effectiviteit heel erg.

1-2-3-4-5

26. Op een schaal van een tot vijf (waarbij 1 het laagst en 5 het hoogst is), hoe zou u de effectiviteit van het hitteplan beoordelen?

1-2-3-4-5

Als er nog dingen zijn die u wilt opmerken, kan dit in het volgende tekstvlak.

□

Dit was het einde van de vragenlijst. Bedankt voor uw tijd.

10.3. Output Atlas.ti

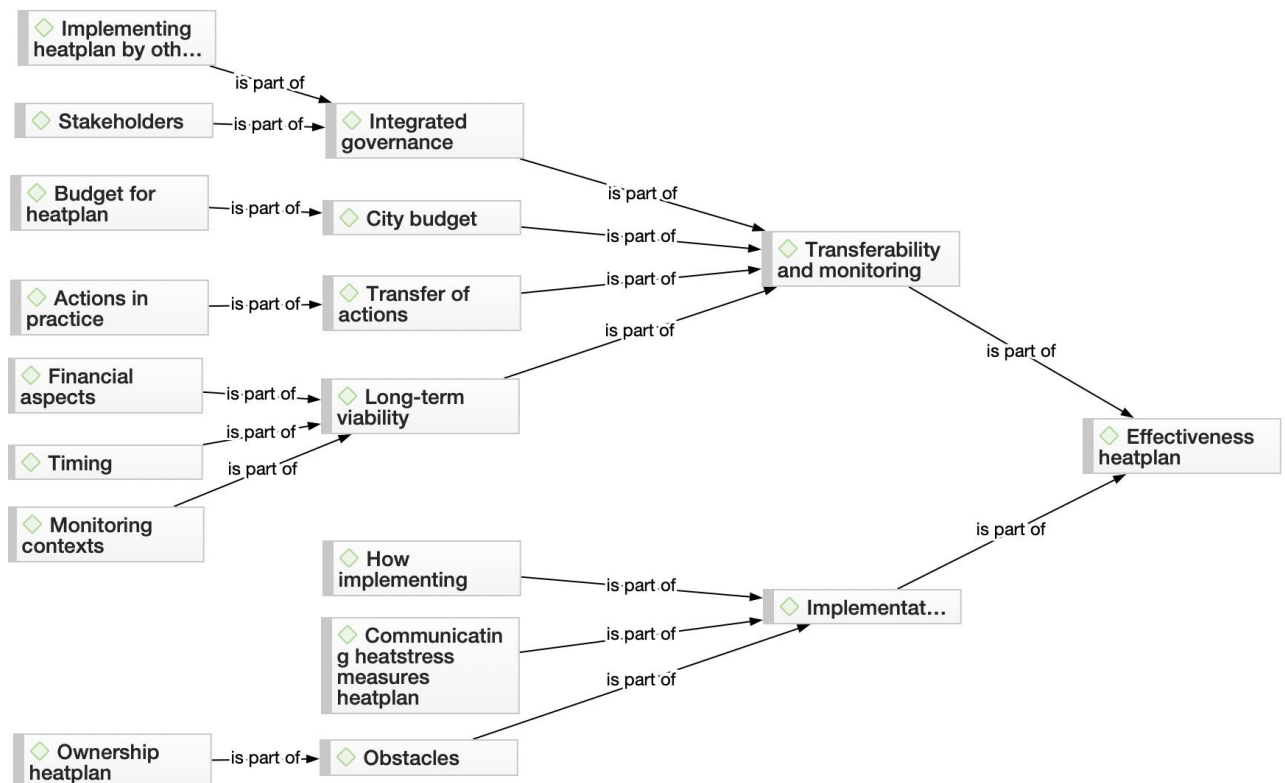


Figure 5. Network indicators expert interviews

10.4. Output SPSS

Part I

Q3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	32	16.2	16.2	16.2
	2	19	9.6	9.6	25.9
	3	25	12.7	12.7	38.6
	4	43	21.8	21.8	60.4
	5	78	39.6	39.6	100.0
Total		197	100.0	100.0	

Q4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	143	72.6	72.6	72.6
	2	54	27.4	27.4	100.0
	Total	197	100.0	100.0	

Q5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	5.1	5.1	5.1
	2	22	11.2	11.2	16.2
	3	68	34.5	34.5	50.8
	4	9	4.6	4.6	55.3
	5	88	44.7	44.7	100.0
Total		197	100.0	100.0	

Q26_1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	26	13.2	17.7	17.7
	2	38	19.3	25.9	43.5
	3	58	29.4	39.5	83.0
	4	21	10.7	14.3	97.3
	5	4	2.0	2.7	100.0
Total		147	74.6	100.0	
Missing	System	50	25.4		
Total		197	100.0		

Descriptives

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q3	197	1	5	3.59	1.488
Q4	197	1	2	1.27	.447
Q5	197	1	5	3.73	1.276
Q26_1	147	1	5	2.59	1.026
Valid N (listwise)	147				

Figure 6. & 7.

Part II

Correlations

Correlations

		Q26_1
Q4	Pearson Correlation	-.032
	Sig. (2-tailed)	.705
	N	147

Nonparametric Correlations

Correlations

		Q26_1	
Spearman's rho	Q3	Correlation Coefficient	-.006
		Sig. (2-tailed)	.940
		N	147

Nonparametric Correlations

Correlations

		Q26_1	
Spearman's rho	Q5	Correlation Coefficient	-.238**
		Sig. (2-tailed)	.004
		N	147

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 8.

Part III

Nonparametric Correlations

Correlations

Q6

Spearman's rho	Q22_1	Correlation Coefficient	.099
		Sig. (2-tailed)	.235
		N	147

Nonparametric Correlations

Correlations

Q6

Spearman's rho	Q23_1	Correlation Coefficient	.011
		Sig. (2-tailed)	.895
		N	147

Nonparametric Correlations

Correlations

Q6

Spearman's rho	Q26_1	Correlation Coefficient	-.064
		Sig. (2-tailed)	.439
		N	147

Nonparametric Correlations

Correlations

Q7

Spearman's rho	Q22_1	Correlation Coefficient	.130
		Sig. (2-tailed)	.117
		N	147

Nonparametric Correlations

Correlations

Q7

Spearman's rho	Q23_1	Correlation Coefficient	.015
		Sig. (2-tailed)	.859
		N	147

Nonparametric Correlations

Correlations

Q7

Spearman's rho	Q26_1	Correlation Coefficient	-.003
		Sig. (2-tailed)	.969
		N	147

Figure 9. & 10.

Part IV

Nonparametric Correlations

Correlations

Q8

Spearman's rho	Q22_1	Correlation Coefficient	.199*
		Sig. (2-tailed)	.016
		N	147

*. Correlation is significant at the 0.05 level (2-tailed).

Nonparametric Correlations

Correlations

Q8

Spearman's rho	Q23_1	Correlation Coefficient	.100
		Sig. (2-tailed)	.229
		N	147

Nonparametric Correlations

Correlations

Q8

Spearman's rho	Q26_1	Correlation Coefficient	.046
		Sig. (2-tailed)	.577
		N	147

Nonparametric Correlations

Correlations

Q9

Spearman's rho	Q22_1	Correlation Coefficient	.368**
		Sig. (2-tailed)	<.001
		N	147

** Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations

Q9

Spearman's rho	Q23_1	Correlation Coefficient	.247**
		Sig. (2-tailed)	.003
		N	147

** Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations

Q9

Spearman's rho	Q26_1	Correlation Coefficient	.096
		Sig. (2-tailed)	.246
		N	147

Nonparametric Correlations

Correlations

Q10

Spearman's rho	Q22_1	Correlation Coefficient	.213**
		Sig. (2-tailed)	.010
		N	147

** Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations

Q10

Spearman's rho	Q23_1	Correlation Coefficient	.086
		Sig. (2-tailed)	.303
		N	147

Nonparametric Correlations

Correlations

Q10

Spearman's rho	Q26_1	Correlation Coefficient	-.024
		Sig. (2-tailed)	.774
		N	147

Figure 11. & 12. & 13.

Part V Nonparametric Correlations

Correlations			Q11
Spearman's rho	Q22_1	Correlation Coefficient	.204*
		Sig. (2-tailed)	.013
		N	147

*. Correlation is significant at the 0.05 level (2-tailed).

Nonparametric Correlations

Correlations			Q11
Spearman's rho	Q23_1	Correlation Coefficient	.137
		Sig. (2-tailed)	.097
		N	147

Nonparametric Correlations

Correlations			Q11
Spearman's rho	Q26_1	Correlation Coefficient	.076
		Sig. (2-tailed)	.360
		N	147

Figure 14.

Part VI Correlations

Correlations			Q22_1
Q26_1	Pearson Correlation		.374**
	Sig. (2-tailed)		<.001
	N		147

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations

Correlations			Q26_1
Q23_1	Pearson Correlation		.479**
	Sig. (2-tailed)		<.001
	N		147

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 15.

Part VII
Nonparametric Correlations

Correlations

Q12

Spearman's rho	Q24_1	Correlation Coefficient	.101
		Sig. (2-tailed)	.222
		N	147

Nonparametric Correlations

Correlations

Q12

Spearman's rho	Q25_1	Correlation Coefficient	.089
		Sig. (2-tailed)	.283
		N	147

Nonparametric Correlations

Correlations

Q12

Spearman's rho	Q26_1	Correlation Coefficient	-.026
		Sig. (2-tailed)	.757
		N	147

Nonparametric Correlations

Correlations

Q13

Spearman's rho	Q24_1	Correlation Coefficient	.461**
		Sig. (2-tailed)	<.001
		N	147

** . Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations

Q13

Spearman's rho	Q25_1	Correlation Coefficient	-.020
		Sig. (2-tailed)	.808
		N	147

Nonparametric Correlations

Correlations

Q13

Spearman's rho	Q26_1	Correlation Coefficient	-.155
		Sig. (2-tailed)	.061
		N	147

Figure 16. & 17.

Part VIII
Nonparametric Correlations

Correlations

Q14

Spearman's rho	Q24_1	Correlation Coefficient	-.171*
		Sig. (2-tailed)	.039
		N	147

* . Correlation is significant at the 0.05 level (2-tailed).

Nonparametric Correlations

Correlations

Q14

Spearman's rho	Q25_1	Correlation Coefficient	-.009
		Sig. (2-tailed)	.910
		N	147

Nonparametric Correlations

Correlations

Q14

Spearman's rho	Q26_1	Correlation Coefficient	-.127
		Sig. (2-tailed)	.125
		N	147

Nonparametric Correlations

Correlations

Q15

Spearman's rho	Q24_1	Correlation Coefficient	.102
		Sig. (2-tailed)	.221
		N	147

Nonparametric Correlations

Correlations

Q15

Spearman's rho	Q25_1	Correlation Coefficient	-.009
		Sig. (2-tailed)	.917
		N	147

Nonparametric Correlations

Correlations

Q15

Spearman's rho	Q26_1	Correlation Coefficient	.143
		Sig. (2-tailed)	.084
		N	147

Figure 18. & 19.

Part IX Nonparametric Correlations

Correlations

		Q16	
Spearman's rho	Q24_1	Correlation Coefficient	-.191*
		Sig. (2-tailed)	.021
		N	147

*. Correlation is significant at the 0.05 level (2-tailed).

Nonparametric Correlations

Correlations

		Q16	
Spearman's rho	Q25_1	Correlation Coefficient	.136
		Sig. (2-tailed)	.100
		N	147

Nonparametric Correlations

Correlations

		Q16	
Spearman's rho	Q26_1	Correlation Coefficient	-.020
		Sig. (2-tailed)	.807
		N	147

Figure 20.

Part X Correlations

Correlations

		Q26_1	
Q24_1	Pearson Correlation	.135	
	Sig. (2-tailed)	.104	
	N	147	

Correlations

Correlations

		Q26_1	
Q25_1	Pearson Correlation	.355**	
	Sig. (2-tailed)	<.001	
	N	147	

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 21.

Part XI Nonparametric Correlations

Correlations			Q20
Spearman's rho	Q17	Correlation Coefficient	.403**
		Sig. (2-tailed)	<.001
		N	147

** . Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations			Q20
Spearman's rho	Q18	Correlation Coefficient	.227**
		Sig. (2-tailed)	.006
		N	147

** . Correlation is significant at the 0.01 level (2-tailed).

Nonparametric Correlations

Correlations			Q20
Spearman's rho	Q21	Correlation Coefficient	-.162
		Sig. (2-tailed)	.051
		N	147

Nonparametric Tests

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig. ^{a,b}	Decision
1	The distribution of Q20 is the same across categories of Q19.	Independent-Samples Kruskal-Wallis Test	.238	Retain the null hypothesis.

- a. The significance level is .050.
b. Asymptotic significance is displayed.

Independent-Samples Kruskal-Wallis Test

Q20 across Q19

Independent-Samples Kruskal-Wallis Test Summary	
Total N	147
Test Statistic	19.614 ^{a,b}
Degree Of Freedom	16
Asymptotic Sig.(2-sided test)	.238

- a. The test statistic is adjusted for ties.
b. Multiple comparisons are not performed because the overall test does not show significant differences across samples.

Figure 22. & 23.

Part XII Nonparametric Correlations

Correlations

			Q26_1
Spearman's rho	Q20	Correlation Coefficient	.203*
		Sig. (2-tailed)	.014
		N	147

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 24.

10.5. Social media posts Municipality Utrecht

2022

Facebook

Gemeente Utrecht 10 aug. 2022 · 🌐

Code geel 🌞 en rood en bruin, met een toefje slagroom. IJsjes en spelen in fonteinen zijn van levensbelang deze dagen. Heel vervelend. Alle gekheid op een stokje: let deze hete dagen even extra op kwetsbare naasten en huisdieren. Kijk voor verkoelende tips op www.utrecht.nl/hitte

105 18 opmerkingen 13 keer gedeeld

Vind ik leuk Opmerking plaatsen Delen

Gemeente Utrecht 18 jul. 2022 · 🌐

Woord van de week: water. Doe er wat leuks mee. Drink het veel, speel er mee, zwem erin, doe het bevroren in je drankje, lik eraan als ijsje. Utrechts water is nú op z'n lekkerst. 🍷 utrecht.nl/hitte

79 9 opmerkingen 6 keer gedeeld

Startpagina Vrienden Video Marketplace Meldingen Menu

Figure 25. & 26.

2023

Instagram



Figure 27.