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Heatwaves and vulnerable populations: Mapping their needs in The Hague

Final report, February 2022

By

Sylvia I. Bergh

Ashley Richard Longman

Erwin van Tuijl

let's change
YOU. US. THE WORLD.

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

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Heatwaves and vulnerable populations: Mapping their needs in The Hague

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Executive Summary

This applied research project aimed to generate a better understanding of the effects of heatwaves on vulnerable population groups in the municipality of The Hague, and suggests ways in which the municipality can help such groups to cope with these heatwaves. The research was funded by the municipality of The Hague and implemented as a cooperation between (and with co-funding from) the Centre of Expertise Global Governance at The Hague University of Applied Sciences (THUAS), the International Institute of Social Studies (ISS, Erasmus University Rotterdam) and the International Centre for Frugal Innovation (ICFI, Leiden-Delft-Erasmus Universities). It was implemented between March 1st and December 31st, 2021. The research focused mostly on independently living seniors in the neighbourhoods ('buurt') of Schilderswijk and Transvaal and the district ('stadsdeel') of Loosduinen. The four research questions asked about the socio-economic, age, gender, health and other relevant characteristics of the vulnerable populations in Schilderswijk, Transvaal and Loosduinen (Question 1), their needs in order to adapt to heatwaves (Question 2), the sustainable (frugal) solutions that exist to better meet vulnerable populations' needs during periods of extreme heat, and the extent to which these can be institutionalised (Question 3), and the actions that the municipality of The Hague could undertake to address these needs and thereby contribute to urban resilience (focusing in particular on how the municipality could adapt the way it communicates on heat wave-related risks with vulnerable populations – Question 4).

The data consisted of 164 completed surveys: 92 in Loosduinen, and 72 in Schilderswijk and Transvaal (44 and 28 respectively), as well as three Focus Group Discussions and 23 interviews with representatives of the target population, experts in the field of public health, heat, and resilience, policymakers, advisors, entrepreneurs that offer innovative solutions for use during a heatwave, healthcare workers, and housing corporations. Desk research as well as an online validation workshop helped to contextualise and verify the findings. Research limitations included limited access to the target population due to data protection rules, selection bias, institutional barriers, the lack of an extreme heat event in the summer of 2021, and restrictions imposed by the COVID-19 pandemic.

There are six main sets of findings. First, we observed a paradox in terms of the solutions that citizens use to cope with heat: Whilst senior citizens have an inherent understanding of how to protect themselves (by going outside less often during the warmest period of the day, cooling themselves and their living spaces, and adapting their daily routine) they do not often apply this knowledge to actions which actively aim to cool their internal body temperature and thus reduce possible negative health outcomes. We found limited usage of relatively simple and effective solutions, such as ventilation and reducing the body temperature by using a footbath or wetting the face. Similarly, many of those surveyed do not seek out a cool space inside or outside of the home. This points to a lack of physiological knowledge on how the body works and how and why it should be cooled. In general, seniors do not see themselves as vulnerable to heat and they underestimate the risk signature of heat due to positive cultural associations with warm/hot weather. However, over 80% of respondents were concerned about the cost of cooling and how they can cool themselves.

Second, the findings point to the importance of (in)formal networks around senior citizens in addressing their needs during periods of extreme heat. Reducing their vulnerability requires a holistic approach based on their personal experiences and (financial) capacities.

Third, the research generated an overview (and detailed list) of solutions that are either available on the market (products and services) or which can be easily 'constructed' by senior citizens themselves, using materials that are widely available. They can be categorised using two dimensions, namely, 1) function (i.e. creating shadow or cooling) and 2) complexity (of access and use). Creating shadow encompasses solutions that protect citizens against heat by limiting (direct) sunshine in their homes, on their balcony and/or their garden. These are well-known solutions (e.g. sun screens, blinds, window foil and parasols) and pragmatic solutions (e.g. using bed sheets) as well as lesser known products on the Dutch market, such as sun sails/canopies ('schaduwdoeken') and balcony awnings ('klemluifel'). Cooling includes pragmatic solutions (e.g. using a wet towel and sponge), specific appliances (e.g. air conditioning and electric fans), and relatively new products and services such as the Cobber Cooling Shawls ('afkoelsjaal'), cooling vests ('koelvest'), misting systems ('nevelsysteem'), smart cups, and the public cooling centres which will be provided by the municipality of The Hague.

Three solutions –sunscreens, air conditioning, roof insulation or having a green roof - are highly ranked as options that the survey respondents would like to implement in their (communal) living space but they face high costs and institutional barriers. As seniors and organisations are not aware of any available municipal subsidies to install sun screens on windows, we suggest to explore whether the Social Support Act ('Wet maatschappelijke ondersteuning' or WMO) can be used to subsidise these purchases.

The findings also question the usefulness of the public cooling centres concept. Proposed alternatives for the existing cooling centre concept include either the creation of cooled spaces within apartment buildings (e.g. by installing an air-conditioner in the communal living room) or closer to the buildings where seniors live, or through organising transport from senior's homes to the cooling centres.

Fourth, the report suggests that despite the individual and context-specific nature of seniors' needs to cool and protect themselves, it would be helpful if, for example, housing corporations would create an inventory of the needs of their tenants and consider buying equipment in bulk, given the high number of apartments in (social) housing blocks. In addition, flexibility in purchasing is needed and central purchasing lists should be regularly updated to reflect new solutions on the market. More opportunities should also be created for entrepreneurs and the "demand side", i.e. users or those acting on behalf of users, to meet.

Fifth, the main policy recommendations centre around the ownership of heat as an urban resilience problem. The effects of heat are typically categorised in three policy areas: 1) public space; 2) buildings and homes (housing); and 3) health. There needs to be a problem owner ('probleemhouder') with the necessary (legal, political) authority and (financial, human) resources to get other relevant actors to deliver on the tasks and agreements made in the local Heat Plan (which was developed in the summer of 2021 and published in February 2022). Such a 'hitte regisseur' or coordinator should have ownership over the topic and bring the different departments in the three policy areas together but should not 'belong' to any one of the existing departments with their individual policy mandates. Instead they should sit across the different policy domains. However, the Resilient The Hague team could be an exception here as its mission cuts across different policy fields.

Furthermore, the current list of core partners in the local Heat Plan could be extended by including the private sector in the form both of entrepreneurs that could market affordable and accessible innovations to those who need them, but also in the form of shopping centres or shop owners who would like to offer their air-conditioned spaces as cool spaces during a heatwave. Institutional care providers could also be involved more.

Making public space and housing (in addition to health) part of the local Heat Plan would also increase opportunities for citizen participation and the continuous dialogue that are needed to: 1) communicate the saliency of the issue and the need for behavioural change to decrease their vulnerability to heat; and 2) transform the current sense of powerlessness we found among inhabitants (especially those living in social housing) to change their circumstances into a sense of agency. An important starting point for this is to help people to become aware of affordable and user-friendly solutions, subsidy possibilities, and networking opportunities, amongst other options. For this, effective communication is needed.

Sixth, we divided the findings on communication into three topics, the 3Rs: risk, role, and relief. With risk we mean the risk signature of heat, or how deadly it can be. Role encompasses how citizens can be activated to reduce possible harm during periods of heat as well as the role of professionals and (in)formal networks. With relief, we refer to the communication of the possible solutions, many of which are already in the local Heat Plan. These three themes cover the three main findings of this research: Firstly, seniors are not fully aware of the risk that heat poses to their health. Secondly, at all layers of social organisation (formal and informal; citizens and administrators; expert and layperson) we see fragmentation and a lack of awareness of who does what; and finally, seniors are not aware of the existing solutions. Trusted and neutral organisations (such as care organisations and community centres) should therefore be more involved as they can communicate more effectively with the seniors. Indeed, an overarching finding is the need to reduce the knowledge gap and distance between 'heat professionals' and those (trusted and neutral) actors who are in close and regular contact with vulnerable seniors so that the available information reaches them in a timely and easily accessible manner.

The report includes ten main recommendations for the municipality of The Hague, grouped under the headings of the four main phases in the local Heat Plan: preparation phase (autumn/winter), pre-warning phase (spring), warning phase (summer) and evaluation phase (autumn/winter). It is hoped that the findings and recommendations in this report will help the municipality of The Hague to further develop its local Heat Plan and increase urban resilience with regard to heatwaves more generally.

Samenvatting

Dit toegepast onderzoeksproject had tot doel om een beter inzicht te verkrijgen in de effecten van hittegolven op kwetsbare bevolkingsgroepen in de gemeente Den Haag, en suggereert manieren waarop de gemeente deze groepen kan helpen om beter met deze hittegolven om te gaan. Het onderzoek werd gefinancierd door de gemeente Den Haag en was uitgevoerd als een samenwerking tussen (en met medefinanciering van) het Kenniscentrum Global Governance van de Haagse Hogeschool (HHS), het International Institute of Social Studies (ISS, Erasmus Universiteit Rotterdam) en het International Centre for Frugal Innovation (ICFI, Leiden-Delft-Erasmus Universiteiten). Het werd uitgevoerd tussen 1 maart en 31 december 2021. Het onderzoek richtte zich voornamelijk op zelfstandig wonende senioren in de buurten Schilderswijk en Transvaal, en stadsdeel Loosduinen. De vier onderzoeksvragen gingen in op de sociaal-economische, leeftijds-, geslachts-, gezondheids- en andere relevante kenmerken van de kwetsbare bevolkingsgroepen in Schilderswijk, Transvaal en Loosduinen (vraag 1), hun behoeften om zich aan te passen aan hittegolven (vraag 2), de duurzame (spaarzame; 'frugal') oplossingen die er zijn om beter tegemoet te komen aan de behoeften van kwetsbare bevolkingsgroepen tijdens perioden van extreme hitte, en de mate waarin deze geïnstitutionaliseerd kunnen worden (vraag 3), en de acties die de gemeente Den Haag zou kunnen ondernemen om aan deze behoeften tegemoet te komen en zo bij te dragen aan de stedelijke veerkracht (met name gericht op hoe de gemeente de manier waarop zij met kwetsbare bevolkingsgroepen communiceert over hittegolf gerelateerde risico's zou kunnen aanpassen - vraag 4).

De gegevens bestonden uit 164 ingevulde enquêtes: 92 in Loosduinen, en 72 in Schilderswijk en Transvaal (respectievelijk 44 en 28), evenals drie focusgroepsdiscussies en 23 interviews met vertegenwoordigers van de doelgroep, deskundigen op het gebied van volksgezondheid, hitte en veerkracht, beleidsmakers, adviseurs, ondernemers die innovatieve oplossingen aanbieden voor gebruik tijdens een hittegolf, werknemers in de gezondheidszorg, en woningcorporaties. Deskresearch en een online validatieworkshop hielpen om de bevindingen te contextualiseren en te verifiëren. Tot de beperkingen van het onderzoek behoorden beperkte toegang tot de doelpopulatie als gevolg van gegevensbeschermingsregels, selectie bias, institutionele belemmeringen, het ontbreken van een hittegolf in de zomer van 2021, en beperkingen door de COVID-19 pandemie.

Er zijn zes belangrijke bevindingen. Ten eerste hebben we een paradox waargenomen in termen van de oplossingen die burgers gebruiken om met hitte om te gaan: Hoewel senioren een inherent begrip hebben van hoe ze zichzelf kunnen beschermen (door minder vaak naar buiten te gaan tijdens de warmste periode van de dag, zichzelf en hun woonruimten te koelen en hun dagelijkse routine aan te passen) passen ze deze kennis niet vaak toe op acties die actief gericht zijn op het koelen van hun interne lichaamstemperatuur en zo mogelijke negatieve gezondheidsuitkomsten te verminderen. We constateerden een beperkt gebruik van relatief eenvoudige en doeltreffende oplossingen, zoals ventilatie en verlaging van de lichaamstemperatuur door het gebruik van een voetbad of het natmaken van het gezicht. Ook zoeken veel van de ondervraagden geen koele ruimte binnen of buiten de woning op. Dit wijst op een gebrek aan fysiologische kennis over hoe het lichaam werkt en hoe en waarom het moet worden gekoeld. In het algemeen zien senioren zichzelf niet als kwetsbaar voor hitte en onderschatten zij de risicosignatuur van hitte vanwege positieve culturele associaties met warm/heet weer. Meer dan 80% van de respondenten maakt zich echter zorgen over de kosten van verkoeling en over hoe zij zichzelf kunnen verkoelen.

Ten tweede wijzen de bevindingen op het belang van (in)formele netwerken rond senioren om in hun behoeften te voorzien tijdens periodes van extreme hitte. Het verminderen van hun kwetsbaarheid vereist een holistische aanpak gebaseerd op hun persoonlijke ervaringen en (financiële) mogelijkheden.

Ten derde heeft het onderzoek een overzicht (en gedetailleerde lijst) opgeleverd van oplossingen die ofwel op de markt beschikbaar zijn (producten en diensten) of die gemakkelijk door senioren zelf kunnen worden 'geconstrueerd' met behulp van materialen die overal verkrijgbaar zijn. Ze kunnen worden gecategoriseerd aan de hand van twee dimensies, namelijk 1) functie (d.w.z. schaduw creëren of koelen) en 2) complexiteit (van toegang en gebruik). Het creëren van schaduw omvat oplossingen die burgers beschermen tegen hitte door de (directe) zonnestraling in hun huis, op hun balkon en/of in hun tuin te beperken. Dit zijn bekende oplossingen (bijv. zonwering, rolgordijnen, raamfolie en parasols) en pragmatische oplossingen (bijv. het gebruik van lakens), maar ook minder bekende producten op de Nederlandse markt, zoals zonnezeilen ('schaduwdoeken') en klemluifels. Koeling omvat pragmatische oplossingen (bijv. gebruik van een natte handdoek en spons), specifieke apparaten (bijv. airconditioning en elektrische ventilatoren), en relatief nieuwe producten en diensten zoals de afkoelsjaals van Cobber, koelvesten, nevelsystemen, slimme bekers, en de openbare koelcentra die zullen worden aangeboden door de gemeente Den Haag.

Drie oplossingen - zonneschermen, airconditioning, dakisolatie of een groen dak - worden hoog gerangschikt als opties die de respondenten graag zouden willen toepassen in hun (gemeenschappelijke) leefruimtes, maar ze stuiten op hoge kosten en institutionele barrières. Omdat senioren en organisaties niet op de hoogte zijn van beschikbare gemeentelijke subsidies voor het plaatsen van zonneschermen , stellen wij voor om te onderzoeken of de Wet maatschappelijke ondersteuning (WMO) kan worden gebruikt om deze aankopen te subsidiëren.

De bevindingen plaatsen ook vraagtekens bij het nut van het concept van openbare koelcentra. Voorgestelde alternatieven voor het bestaande concept van koelcentra zijn onder meer het creëren van gekoelde ruimten binnen gebouwen waar senioren wonen (bv. door het installeren van een airconditioner in een gemeenschappelijke (woon)kamer) of dichter bij de gebouwen waar senioren wonen, of door het organiseren van vervoer van de seniorenwoningen naar de koelcentra.

Ten vierde suggereert het rapport dat ondanks de individuele en contextspecifieke aard van de behoeften van senioren om te koelen en zichzelf te beschermen, het nuttig zou zijn als bijvoorbeeld woningcorporaties een inventarisatie zouden maken van de behoeften van hun huurders en zouden overwegen om apparatuur in grote aantallen aan te schaffen, gezien het grote aantal appartementen in (sociale) woonblokken. Daarnaast is flexibiliteit bij de inkoop nodig en moeten centrale inkooplijsten regelmatig worden geactualiseerd aan de hand van nieuwe oplossingen op de markt. Er moeten ook meer ontmoetingsmogelijkheden worden gecreëerd voor ondernemers en de "vraagzijde", d.w.z. gebruikers (senioren) of degenen die namens gebruikers optreden.

Ten vijfde zijn de belangrijkste beleidsaanbevelingen gericht op het erkennen van hitte als een stedelijk probleem. De effecten van hitte worden doorgaans ingedeeld in drie beleidsgebieden: 1) openbare ruimte; 2) gebouwen en woningen (huisvesting); en 3) gezondheid. Er moet een probleemeigenaar ('probleemhouder') zijn met de nodige (juridische, politieke) autoriteit en (financiële, personele) middelen om andere relevante actoren (mee) te bewegen de taken en afspraken uit het lokale hitteplan (die in de zomer van 2021 is ontwikkeld en in februari 2022 is gepubliceerd) uit te voeren. Zo'n 'hitte regisseur' of coördinator moet eigenaar zijn van het probleem en de verschillende departementen in de drie beleidsgebieden samenbrengen, maar mag niet 'behoren' tot een van de bestaande departementen met hun individuele beleidsmandaten. In plaats daarvan moeten zij over de verschillende beleidsterreinen heen werken. Het "Resilient The Hague"-team zou hier echter een uitzondering kunnen zijn, aangezien zijn opdracht verschillende beleidsterreinen bestrijkt.

Verder zou de huidige lijst van kernpartners in het lokale hitteplan kan worden uitgebreid met de particuliere sector, zowel in de vorm van ondernemers die betaalbare en toegankelijke innovaties op de markt zouden kunnen brengen voor degenen die ze nodig hebben, als in de vorm van winkelcentra of winkeleigenaren die hun geklimatiseerde ruimten tijdens een hittegolf als koele ruimten zouden willen aanbieden. Ook institutionele zorgverleners zouden meer betrokken kunnen worden.

Door openbare ruimte en huisvesting (naast gezondheid) onderdeel te maken van het lokale hitteplan zouden ook meer mogelijkheden ontstaan voor burgerparticipatie en de continue dialoog die nodig is om: 1) de ernst van het probleem, en de noodzaak van gedragsverandering om hun kwetsbaarheid voor hitte te verminderen, over te brengen; en 2) het huidige gevoel van machteloosheid dat we bij de inwoners aantroffen (vooral bij degenen die in sociale woningen wonen) om hun omstandigheden te veranderen, om te zetten in een gevoel van 'agency'. Een belangrijk startpunt hiervoor is om mensen bewust te maken van onder andere betaalbare en gebruiksvriendelijke oplossingen, subsidiemogelijkheden en netwerkmogelijkheden. Hiervoor is effectieve communicatie nodig.

Ten zesde hebben we de bevindingen over communicatie onderverdeeld in drie onderwerpen, de 3R's: risico, rol, en relief (hulp). Met risico bedoelen we de risicosignatuur van hitte, of hoe dodelijk het kan zijn. Rol omvat de manier waarop burgers kunnen worden geactiveerd om mogelijke negatieve gevolgen tijdens hitteperiodes te beperken, alsook de rol van professionals en (in)formele netwerken. Met relief (hulp) verwijzen we naar de communicatie van de mogelijke oplossingen, waarvan er al veel in het lokale hitteplan staan. Deze drie thema's dekken de drie belangrijkste bevindingen van dit onderzoek: Ten eerste zijn senioren zich niet volledig bewust van het risico dat hitte voor hun gezondheid oplevert. Ten tweede zien we op alle lagen van de maatschappelijke organisatie (formeel en informeel; burgers en bestuurders; deskundige en leek) versnippering en een gebrek aan bewustzijn van wie wat doet; en ten slotte zijn senioren niet op de hoogte van de bestaande oplossingen. Vertrouwde en neutrale organisaties (zoals thuiszorg en mantelzorg organisaties, buurthuizen) zouden daarom meer betrokken moeten worden omdat zij effectiever met de senioren kunnen communiceren. Een overkoepelende bevinding is de noodzaak om de kenniskloof en de afstand tussen 'hitteprofessionals' en de (vertrouwde en neutrale) actoren die in nauw en regelmatig contact staan met kwetsbare senioren te verkleinen, zodat de beschikbare informatie hen tijdig en op een laagdrempelige manier bereikt.

Het rapport bevat tien hoofdaanbevelingen voor de gemeente Den Haag, gegroepeerd onder de kopjes van de vier hoofdfasen in het lokale Hitteplan: voorbereidingsfase (herfst/winter), prewaarschuwingsfase (voorjaar), waarschuwingsfase (zomer) en evaluatiefase (herfst/winter). Gehoopt wordt dat de bevindingen en aanbevelingen in dit rapport de gemeente Den Haag zullen helpen bij de doorontwikkeling van het lokale Hitteplan en het vergroten van de stedelijke veerkracht ten aanzien van hittegolven in het algemeen.

Preface

As main researchers (see Appendix A for full details), we are very grateful to the following persons for all their advice, input, and practical help with this project (in alphabetical order):

Majda el Adlouni (Stadsdeel Loosduinen)
Salomey Gyamfi Afrifa (International Institute of Social Studies, Erasmus University Rotterdam)
Marianne van Bochove (The Hague University of Applied Sciences)
Fabienne van den Bor (Gemeente Den Haag)
Annabel Buzink (Het Rode Kruis)
Suzanne Cook (The Hague University of Applied Sciences)
Karin Dornseiffer (Voor Welzijn/Haags Ontmoeten)
Guusje Eggen (GGD Haaglanden)
Cansu Eroglu (Bibliotheek Schilderswijk)
Sem den Hartog (Haags Ontmoeten)
Madeleen Helmer (Klimaatverbond Nederland)
Sanne Hogesteeger (Red Cross Red Crescent Climate Centre)
Inge Homberg (Provincie Zuid-Holland)
Joost van Hoof (The Hague University of Applied Sciences)
Jurriaan van der Meijden (Gemeente Den Haag)
Dennis Penu (The Hague University of Applied Sciences and ISS)
Sherita Poeran (Het Rode Kruis)
Anouk Roeling (Deloitte, formerly Resilient The Hague)
Shellan Saling (ISS)
Irene Sjerp (Stichting Amadeus)
Hans Steenwijk (Stichting Christiaanhof Ouderenzorg)
Hennie Steenwijk (Stichting Christiaanhof Ouderenzorg)
Anna Zuidmeer (Provincie Zuid-Holland)

In addition, we would like to thank our interview partners (see Appendix B for a full list) and Focus Group Discussion participants for their valuable inputs and time.

Finally, this project could not have been carried out without the tireless efforts of our student assistants (Frédérique Kwantes, Mark Prins, Phillipa Purrio, and Delilah van Tol), the insightful advice from our advisory board members (Thea Hilhorst, Peter Knorringa, and Jan Fransen), and the help of all the colleagues at THUAS, ISS and ICFI who helped us with the administrative, financial, legal, and ethical aspects of this research project.

Introduction

"Of course the Heat Plan is great and everyone needs to be protected. But people don't actually know whom they need to go to, they don't have (grand) children, they don't speak the language, this group falls behind with everything, with developments, with news, with research [...] We're also receiving signals about loneliness."

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Background

This applied research project aims to generate a better understanding of the effects of heatwaves on vulnerable population groups in the municipality of The Hague, and suggests ways in which the municipality can help such groups to cope with these heatwaves. The research was performed as a cooperation between The Hague University of Applied Sciences (THUAS), the International Institute of Social Studies (ISS, Erasmus University Rotterdam) and the International Centre for Frugal Innovation (ICFI, Leiden-Delft-Erasmus Universities).

Heatwaves constitute an important yet often overlooked part of climate change and their impacts qualify as disasters. According to the World Disasters Report 2020, the three heatwaves affecting Belgium, France, Germany, Italy, the Netherlands, Spain, Switzerland and the UK in the summer of 2019 caused 3,453 deaths.[1] 2020 was a new record year for the Netherlands because it was the first time that a heatwave included five days in a row during which the temperature reached 35 degrees or more. In addition, 40 degrees was measured for the first time, and periods of tropical days and nights are generally getting longer. Most importantly, this trend is accelerating faster than the climate change models are predicting.[2] In addition, the COVID-19 pandemic is compounding the effect of heatwaves, as vulnerable individuals may be reluctant to seek cool spaces out of fear of infection.[3]

Already in 2006, the Netherlands ranked near the top of the global disaster index due to the number of excess deaths that could be attributed to the heatwave. In the same year, the EU published the first climate strategy in which heat is recognised as a priority. In 2008, the Netherlands developed its first national heat plan.[4] The municipality of The Hague has a municipal climate adaptation strategy and has developed a draft local heat plan in the summer of 2021, which was published in February 2022[5]. This research was not meant to be and was not set up as an evaluation of the current heat plan, which has not yet been activated.

At the level of municipalities and cities, the concept of urban resilience is key. It refers to "*the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience*".[6]

Heatwaves clearly constitute acute shocks which are rapidly developing into chronic stresses. In turn, heatwaves also exacerbate the chronic stresses that are already there, i.e. existing chronic stresses also lead to greater impact of a heatwave. In other words, there are negative interaction effects. Addressing these effects requires overcoming the silo approach to urban governance, in which different municipal departments as well as other stakeholders (such as the Red Cross, housing corporations, tenants' associations, care organisations, entrepreneurs etc.) each address different parts of the problem, rather than doing so in an integrated and inclusive manner.[7]

1 IFRC (2020) World Disasters Report 2020: Come Heat or High Water: Tackling the humanitarian impacts of the climate crisis together (Executive summary), p. 10. Available at: **https://www.ifrc.org/sites/default/files/2021-05/20201116_WorldDisasters_Full.pdf**

2 See also the article 'KNMI: heftigheid hittegolven 'volledig onderschat' door computermodellen', available at **https://nos.nl/artikel/2343724-knmi-heftigheid-hittegolven-volledig-onderschat-door-computermodellen.html**

3 See the guidance note 'Extreme Heat during the COVID-19 Pandemic' by the IRC's Climate Centre, available at: **http://climatecentre.org/downloads/files/HWG%20appendix%20Extreme%20Heat%20during%20the%20COVI D-19%20pandemic.pdf**

4 See **https://www.rivm.nl/hitte/nationaal-hitteplan**

5 See **https://denhaag.raadsinformatie.nl/modules/13/Commissiearchief/view?month=2&year=2022&week=all&module_filter%5Bselect%5D%5B52%5D=none&module_filter%5Bselect%5D%5B69%5D=none&module_filter%5Bselect%5D%5B51%5D=none&module_filter%5Brange%5D%5B7%5D%5Bdata_type%5D=datetime&module_filter%5Brange%5D%5B47%5D%5Bdata_type%5D=datetime&search=hitte&section=**

6 See **https://resilientcitiesnetwork.org/urban-resilience/**

7 Pers.comm. with Anouk Roeling, (then) program officer at The Resilient The Hague team of The Hague municipality, 26 November 2020. See also Singh, R., Arrighi, J., Jjemba, E., Strachan, K., Spires, M., Kadihasanoglu, A., (2019) Heatwave Guide for Cities. Red Cross Red Crescent Climate Centre. Available at: **https://www.climatecentre.org/downloads/files/IFRCGeneva/RCCC%20Heatwave%20Guide%202019%20A4% 20RR%20ONLINE%20copy.pdf**

Based on inputs from The Resilient The Hague Office at the municipality of The Hague as well as a short literature review around these ideas, the research objectives and questions were formulated as follows:

Research Objectives

- To map the characteristics of vulnerable populations in The Hague;
- To understand vulnerable populations' needs in order to adapt to heatwaves;
- To understand what vulnerable populations do to cope with extreme heat;
- To highlight existing sustainable solutions for protecting vulnerable populations;
- To provide advice on how the municipality of The Hague can increase urban resilience with regards to heat; and
- To provide advice on how the municipality of The Hague can better communicate with vulnerable populations with regards to heat.

Research Questions

Based on these research objectives, the research project was structured around four research questions (see: Chapter 2: Methodology, Data Collection, and Limitations for more information on the geographic locations):

> **Research Question 1:** What are the socio-economic, age, gender, health and other relevant characteristics of the vulnerable populations in Schilderswijk and Loosduinen?
>
> **Research Question 2:** What are the vulnerable populations' needs in order to adapt to heatwaves?
>
> **Research Question 3:** What sustainable (frugal) solutions[8] exist to better meet vulnerable populations' needs during periods of extreme heat? To what extent can these be institutionalised?[9]
>
> **Research Question 4:** What can the municipality of The Hague do to address these needs and thereby contribute to urban resilience? In particular, how could the municipality adapt the way it communicates on heat wave-related risks with vulnerable populations?[10]

Financing

The 'Heatwaves' project was financed with a grant (subsidy) of €69,300 from the Municipality of The Hague, through the 'Subsidieregeling Hoger Onderwijs Den Haag 2020', Chapter 2 'Onderwijs dat bijdraagt aan de economie van de stad', Paragraf 2.4 'Investeren in een aantrekkelijke kennis- en onderwijsstad', November 2020, and including co-funding from THUAS, ISS and ICFI. The total budget amounted to €98,999. The Centre of Expertise on Global Governance of The Hague University of Applied Science acted as the main applicant. The project ran from March 1st to December 31st, 2021.

Reading Guide

This report is divided into six chapters. Chapter 1 presents the background to the project and the research design. Chapter 2 discusses the methodology and data collection process. The main findings are presented in Chapters 3 to 5 under the following themes: 'Vulnerable Population's Characteristics and Needs'; 'Chapter 4: Solutions: Adaptive Behaviour, Products, and Cooling Centres'; and 'Solutions: Increased Urban Resilience and Improved Communication'. In Chapter 6 we present our main findings, detailed policy advice, and close with some ideas for further research.

8 Frugal solutions are based on the concept of frugality that is an approach to creatively solving local problems (in this report 'heat') through complexity reduction in resource-constraint environments (Busch, 2021:14; Rosca et al., 2017; Leliveld and Knorringa, 2018). See: Busch, H. C. (2021). Frugal innovation in energy transitions: insights from solar energy cases in Brazil, *Cambridge Journal of Regions, Economy and Society*, 14(2): 321-340; Rosca, E., Arnold, M., Bendul, J.C. (2017) Business models for sustainable innovation - an empirical analysis of frugal products and services. *J. Clean. Prod*. 162: 133-145; Leliveld, A. & Knorringa, P. (2018) Frugal Innovation and Development Research - Introduction, *European Journal of Development Research* 30(1): 1-16.

9 The original formulation for Research Question 3 was "*What sustainable (frugal) solutions have vulnerable populations developed themselves that could be institutionalised? And are there other bottom- up heat resilience initiatives that support local communities, for example by local entrepreneurs?*". Due to the lack of a standard definition in the academic literature about what bottom-up means in this context, this question was adapted. Some examples of solutions implemented by citizens (as found in the literature and data collection) are discussed in the findings (Chapter 4).

10 The original formulation of Research Question 4 included understanding inter-departmental communication, coordination, and procurement. Whilst this is discussed in the results regarding fragmentation, not enough data was available to answer this sub-section of the research question, especially as it pertains to procurement. The institutionalisation of bottom-up initiatives was included in the original formulation of Research Question 4, but for the same reasons as given above for the changes to Research Question 3, this was removed from the final formulation. Original formulation: *What can the municipality of The Hague do to address these needs and thereby contribute to urban resilience? For example, how could it streamline its inter- departmental communication and coordination as well as external procurement processes? How could it bring about a greater alignment between top-down and bottom-up heat resilience initiatives? And finally, how could the municipality adapt the way it communicates on heat wave-related risks with vulnerable populations?*

Methodology, Data Collection, and Limitations

In order to answer the research questions, a mixed methods approach was chosen consisting of surveys with the target population, focus group discussions with seniors, semi-structured interviews with respondents who represented the target population and experts in the field, as well as a validation workshop with (a selection of) interview respondents, the advisory board, and other involved parties.

Target Population: Defining 'vulnerable populations'

For this project, vulnerable populations in The Hague were defined as groups which were vulnerable in terms of public health during periods of extreme heat. For clarity, this is in opposition to populations who would traditionally be considered socially vulnerable (e.g. the home and houseless, migrant populations, children etc). Although there are overlaps in these two groups, the decision was taken to focus on The Hague's senior citizens. In 2018, the municipality of The Hague commissioned researchers at the TU Delft to produce the Haagse Hitte report[11], which gives a very detailed picture of the Urban Heat Islands and proposes adaptive solutions. The report also identified older people (aged 75 and above) as the most vulnerable.

Whilst those above 75 are the most vulnerable to extreme heat, senior citizens are a difficult group to reach and limiting our target group to only those 75+ would present methodological difficulties regarding access. Furthermore, when we discuss 'vulnerabilities' rather than 'being vulnerable', the risk factors (health, loneliness, etc) are present also for those above 65. Finally, organisations, activities, and institutionalised networks aimed at citizens above 75 also often accommodate all senior citizens (i.e. 65+), thus offering access to a wider section of citizens who become vulnerable due to extreme heat events. We therefore decided to focus this study on citizens aged 65 and older.

Geographical Focus

Due to the (assumed) existence of heat plans in care homes and intramural facilities which ensure that the needs of senior citizens are protected, the decision was made to focus on independently living seniors ('zelfstandig wonende senioren') which constitute almost 95% of senior citizens in The Hague.[12]

The neighbourhood ('buurt') of Schilderswijk and district ('stadsdeel') of Loosduinen were chosen as case studies. These two areas were chosen for their similarities and differences including socio-economic status, level of immigration, heat island effect (Schilderswijk) and above average aging of population (Loosduinen). Due to difficulties in reaching the target population, the decision was taken in late August to expand from Schilderswijk to include the adjacent neighbourhood of Transvaal, which is demographically very similar to Schilderswijk.

"Schilderswijk and Laakkwartier are where people with a migration background live, many of them come from a hot country. Many of these people don't realise that the climate in the Netherlands is different when it comes to heat than where they come from. In the Netherlands, life continues. It's different here, there are no siestas, no-one takes the combination of heat and work into account [...] you live in a high density area with a lot of buildings and concrete, which is why it's even warmer with [global] warming and such. Furthermore, within this group, their priorities are very different [referring to financial concerns etc]"

AT2_G1_12

11 Frank van der Hoeven, Alexander Wandl, TU Delft Bouwkunde: Haagse Hitte: Het Haagse warmte-eiland in kaart gebracht. Available at: **https://books.bk.tudelft.nl/press/catalog/view/isbn.9789463660037/705/546-1**

12 Tabel 4.1 "Verdeling van de groep ouderen naar woonvorm (absoluut en procentueel). **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**

Choosing these areas allows for a comparative element in the research where two cultural dimensions, as evidenced by the above quote, can be considered. Firstly, the high level of diversity in The Hague influences the learned experience of citizens on how to cope with periods of heat. The high level of immigration in the Schilderswijk (and Transvaal) allowed for more learning based on how citizens with higher levels of past experience with heat cope during heatwaves. The population in these two neighbourhoods is also the most vulnerable in terms of socio-economic status and integration in the local society of all neighbourhoods in The Hague. Understanding their behaviour and priorities allows for a more holistic approach to protecting citizens.

Secondly, due to its historical relationship with heat, Dutch society is primed to see heat as an enjoyable and pleasant phenomenon, and not as something to worry about. There is therefore a lack of appreciation for the dangers it can pose. The demographic makeup of Loosduinen (less diverse in terms of migration background[13], and with more senior citizens[14]) allows for some comparative power with the Schilderswijk in terms of the differences in experience and awareness (See: Table 1 for details).

District	80+	65+	55+
Centrum (incl. Schilderswijk)	1,981 (2%)	12,027 (11%)	24,045 (23%)
Loosduinen	4,004 (9%)	13,859 (28%)	21,230 (43%)

Table 1: Population size (and percentage of total population) per area for different age groups (Source: Ouderenmonitor, 2020) [15]

Design and Data collection

Prior to data collection, the research design was developed and presented to the project's advisory board and interested colleagues at a research lunch hosted by the Centre of Expertise on Global Governance (The Hague University of Applied Sciences) on June 7th, 2021. The research design was then adjusted based on the feedback we received. At the same time, a literature review was completed to provide an overview of the existing academic knowledge in the field. The findings of the literature review informed the survey design and questions for the interviews.

Among others, the members of Stichting Amadeus (Loosduinen), themselves part of the target population, provided feedback on the survey design as well as advised on possible themes to include before the research team piloted the questionnaire on the ground on the 16th and 17th of August, 2021.

Piloting and fine-tuning of the questionnaire took place prior to implementing the survey. Relevant civil society organisations, neighbourhood organisers, and care organisations were all contacted either directly by e-mail or through their social media accounts to invite their members/clients to participate in the research. This was aimed at increasing the visibility of the project, alleviate any safety or ethical concerns, and increase the possible response rate.

Data collection took place from mid-August 2021 through to the end of November 2021. In the first phase of data collection, face-to-face surveys were completed by respondents on the street or where possible by visiting senior-oriented events. These included a session of Haags Ontmoeten, a meeting of the Residents' Committee ('Bewonerscommissie') Paulus Potterstraat, and a coffee morning at the Community Centre ('buurtcentrum') Mandelaplein. When this was requested as the preferred option by the respondents, surveys were also completed via email or telephone. In total, 164 surveys were completed: 92 in Loosduinen, and 72 in Schilderswijk and Transvaal (44 and 28 respectively).

During the course of the research, information about the project and a link to an online version of the survey were posted on numerous neigbourhood specific Facebook pages (for example, 'Kom Loosduinen' and 'Bij ons in Loosduinen'). Many other social media sites were contacted but did not respond to requests to post the information. The managers of approximately 15 senior living complexes were contacted for permission to conduct surveys in their buildings. However, unfortunately no-one responded.

BTO Thuiszorg, a home care organisation active in The Hague region, conducted a shortened version of the survey (See: Appendix C. Survey Design and Modes) with 18 of their clients. The questions focused on the demographic features of the target population as well as their needs during period of extreme heat. Surveys were conducted either telephonically by the schedulers or by the care workers when they visited the clients. To reduce the burden on the care workers, the survey was designed to only take 5 minutes, compared to the 10-15 minutes allowed for the full survey.

13 91.2% of people living in Schilderswijk have a migration background. In the district of Loosduinen, this is 33.8% (and slightly higher at 35.3% in the neighbourhood of Loosduinen). Source: **https://denhaag.incijfers.nl/**

14 11.3% of those living in Schilderswijk are over the age of 65. In the district of Loosduinen this is 28% (24.5% for the neighbourhood of Loosduinen). Source: **https://denhaag.incijfers.nl/**

15 **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**

In the second phase of data collection, two additional methods were used to gain further insights. First, Focus Group Discussions were planned with the target group:

- Monday 25th of October 2021: Bibliotheek Schilderswijk (Schilderswijk). This event was cancelled since only one person was present.
- Friday 29th of October 2021: Stichting Christiaanhof Ouderenzorg (Transvaal). 20 participants attended and were divided into three different groups with about seven participants each. Each group was facilitated by one researcher or a pair of researchers. The focus groups each lasted an hour in total.

All organisations who had responded positively to previous requests to bring us in contact with the target group were again contacted to host a focus group. Initial positive responses included either arranging access to the target population or interest in the research but they were unable to accommodate at that time. In addition to these groups, all public libraries in the districts of Centrum and Loosduinen were contacted. Only Bibliotheek Schilderswijk was positive in their response. Many others forwarded details to the project leader of 'Ouderen in de Wijk', who was also contacted personally, but never responded.

Second, between 7 October and 4 November, 23 interviews were conducted with respondents who represented the target population, experts in the field of public health, heat, and resilience, policymakers, advisors, representatives of companies that offer innovative solutions for use during a heatwave, healthcare workers, and housing corporations. Further desk research was conducted to determine entrepreneurs and private actors who offer solutions to the challenges faced by citizens during periods of extreme heat. This desk research also contributed to the list of possible interviewees. A full list of interview respondents can be found in Appendix B.

Finally, on December 2nd, 2021, an online Validation Workshop took place with 21 participants, including the full research team and advisory board and representing a good number of the interview respondents and other relevant stakeholders. The research team presented the preliminary findings of the research project. The participants' questions and feedback were very valuable in informing the final presentation of the results in this report.

Ethical Considerations

Ethical considerations were discussed in the (original) research design which was presented to the Ethical Advisory Committee and its pilot programme at The Hague University of Applied Sciences. Positive advice was obtained on July 2nd, together with useful feedback (though most of it pertained to the original research design which assumed the occurrence of a heatwave[16]). As a result, all respondents received a flyer with information about the research, what would be done with their information, and the contact details of the project coordinator in case of any questions.

Research Limitations

The data collection and analysis process was limited by several factors. They are:

Access to the target population: Due to data protection protocols, we were unable to receive a list of targeted addresses from the municipality. Ethical considerations about going door-to-door during the COVID-19 pandemic, as well as safety concerns for respondents and the research team also meant that this option was not followed. Problems with accessing the target population were compounded due to the summer holidays, which meant that many relevant organisations did not respond to our requests to disseminate information to their members/target groups, and/or stopped their activities for/with senior citizens. The summer period was chosen for our fieldwork as it is the period when a heatwave is most likely to occur.

Selection bias: The research team approached eligible-looking respondents on the street and squares. This means our sample was biased in favour of those citizens who are mobile enough to run their own errands. For accessing the most vulnerable populations – i.e. independently living seniors who are less mobile - we were dependent on organisations and institutions. To reduce this bias these organisations were included as interview respondents.

Institutional barriers/willingness: As mentioned earlier, a large number of organisations which have strong links to the target population were contacted on multiple occasions. Unfortunately, a disproportionate number did not respond to our requests to bring us in contact with the target population. This included several employees of the municipality of The Hague and those who are charged with the safety of senior citizens. Those who did respond positively ended up having a large influence on the content of this report and we are very thankful for their assistance.

16 More details on the original research design are discussed further below under "Research Limitations".

A lack of an extreme heat event: In the summer of 2021 there was no heatwave and no days which could be considered as tropical. As a result, the willingness of organisations and senior citizens to discuss the topic was limited, given the reduced salience of the topic. News reporting on the extreme weather events in the Pacific North-West of the USA and Western Canada did help increase the level of relevance somewhat. A lack of extreme heat also meant that some elements of the original research design had to be removed and instead we relied on the respondents' memories of the 2020 heatwave(s).[17]

The COVID-19 Pandemic: the ongoing COVID-19 pandemic posed ethical and practical considerations of what could be asked of the target population. This impacted the ease of being able to conduct surveys in certain settings as well as the willingness of respondents to complete the survey.

Many of these factors represent structural or organisational considerations which inform some of the findings of this report and which will also be discussed in the following chapters.

17 The original research design included two elements that could not be included in the final design. Firstly, we wanted to understand the difference between objective and subjective temperature. This would have been done by offering citizens an air temperature thermometer which would have measured how warm it was in their living space. Respondents would then rank how they felt a few times a day during the period of a heatwave. This would also have provided a comparison of the types of solutions citizens use to stay cool. Secondly, we wanted to understand how citizens adapt during a heatwave. At what point do they move from enjoying the heat, to being uncomfortable, to adapting? Does their behaviour change over the course of a heatwave? This would have been qualitatively measured through the use of a journal with a small number of questions to be completed daily during the course of a heatwave. In order to study these elements, a group of 20 participants was sought.

Vulnerable Populations' Characteristics and Needs

In this chapter, we present our findings related to Research Question 1, 'What are the socio-economic, age, gender, health and other relevant characteristics of the vulnerable populations in Schilderswijk and Loosduinen?' as well as Research Question 2,'What are the vulnerable populations' needs in order to adapt to heatwaves?', drawing on the results of the survey and focus group discussions. Together, these give a snapshot of the respondents and demonstrate the different vulnerabilities that affect the target population during periods of extreme heat. These results inform the findings presented in the chapters which follow.

Demographic Characteristics

In total 164 respondents completed the survey, of which 56% lived in Loosduinen. In Loosduinen, seniors make up 28% of the population. In Schilderswijk and Transvaalkwartier the so-called "65-plussers" make up only 11% and 10% of the total population, respectively.[18] The data is therefore weighted towards those living in Loosduinen. By focussing on the district Loosduinen, we had a far larger population from which to draw our sample. Loosduinen (district) has approximately 50,000 residents compared to 18,000 for Loosduinen (neighbourhood). Demographically, the population across the district and neighbourhood of Loosduinen do not differ largely. Casting a wider net in this context meant a more representative sample of the city of The Hague more generally. 33% of the respondents in Loosduinen identified as male in the survey, as opposed to 45% in in Schilderswijk and Transvaaltkwartier. Our data set is therefore skewed towards female participants.[19] See Table 2 for an overview of the demographic information on the respondents in the research sample.

Demographic Information (n = 164)				
Location	Schilderswijk	Loosduinen	Other[20]	Total
	44	92	28	164
Gender	Male	Female	No response/other	
	60	93	11	164
Accommodation Type (1)	House	Flat in an apartment building	Apartment (with no communal entrance)	Total
	0	50	52	102
Accommodation Type (2)	Owned	Rented		Total
	42	111		153[21]

Table 2: Demographic information on the respondents in the research sample (Source: Survey)

18 See Ouderenmonitor, 2020.
19 Statistically women live longer than men, on average. As a result, even though the data is skewed female, it is more representative of the population as a whole than the gender division may suggest.
20 All but one of the 'other' category for location were based in Transvaal, a neighbourhood that shares a border with Schilderswijk.
21 Not all respondents were willing to answer the questions on their accommodation.

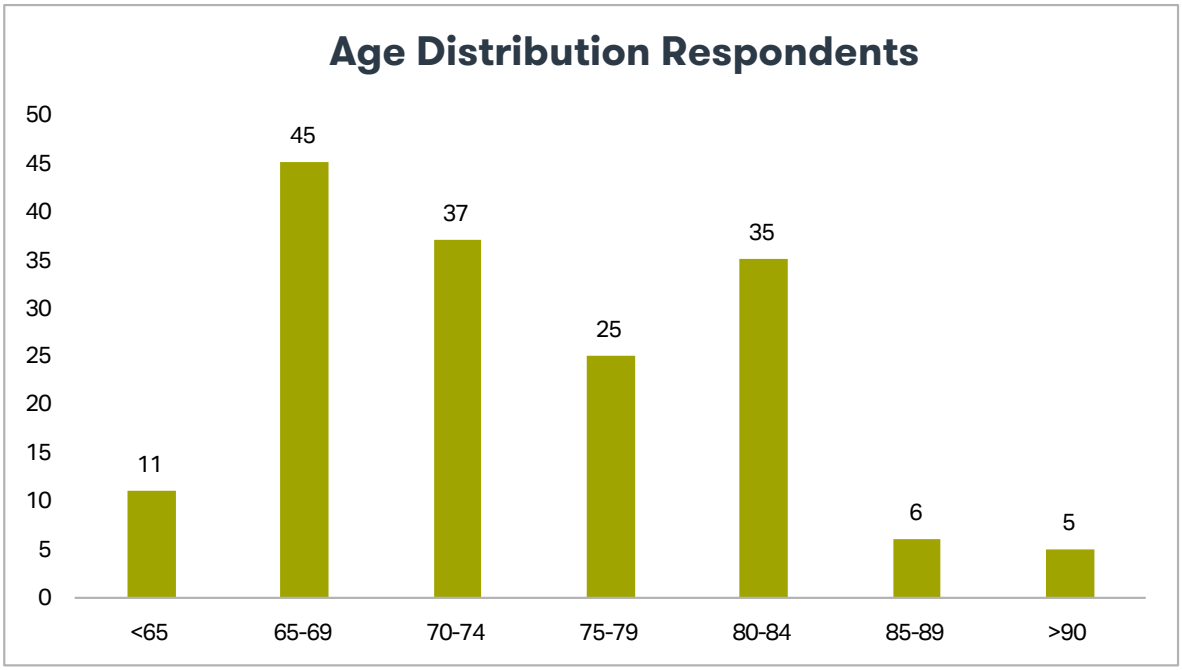

Figure 1: Age distribution of research respondents (Source: Survey)

As we can see in Figure 1 and Table 3, the average age of respondents over the age of 65 was approximately 75 years old.[22] The mode was in the 65-69 category, meaning the largest proportion of respondents were within this age category. However, 43% of the population was above the age of 75, meaning that there was a large representation of those who are most vulnerable or will become relatively more vulnerable in the coming years.

Age	Total	Percentage
<65	11	7%
65-69	45	27%
70-74	37	23%
75-79	25	15%
80-84	35	21%
85-89	6	4%
90+	5	3%

Table 3: Age distribution of research respondents (with percentages) (Source: Survey)

None of the respondents lived in a house[23] and only 28% owned their own home. In the city of The Hague overall, ownership among 65-plussers stands at 47%.[24] A majority (59%) of respondents for whom data is available (n = 153), lived alone. This increases their vulnerability to heat but also to other compounding factors such as loneliness. 32% of respondents lived with a partner. Whilst this decreases their level of social isolation, it can also be compounded when care ('mantelzorg') tasks fall upon one person in the couple. This became clear in the discussions with respondents as well as in the Focus Group Discussions. Many of the participants also had care tasks associated to the healthcare needs of their partner. Questions relating to caring for others were in the initial survey design but were removed based on the feedback we received and for reasons of brevity.

With whom do you live?	Percentage
Alone	59%
With partner	32%
With partner and children	6%
With children	2%
Other	1%

Table 4: Living situation of research respondents (Source: Survey)

22 This was calculated on the middle of each bin. 65 years – 69 years was therefore taken to be 67 years. 90+ was measured as 91.
23 By 'house', we mean a terraced (a house in a row of houses that shares a wall with the houses next to it) or (semi-)detached property. A house as defined in this report is thus different from an apartment where there is more than one property on the same plot of land.
24 See 4.2 Typering Woonsituatie (p. 31) Source: **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**

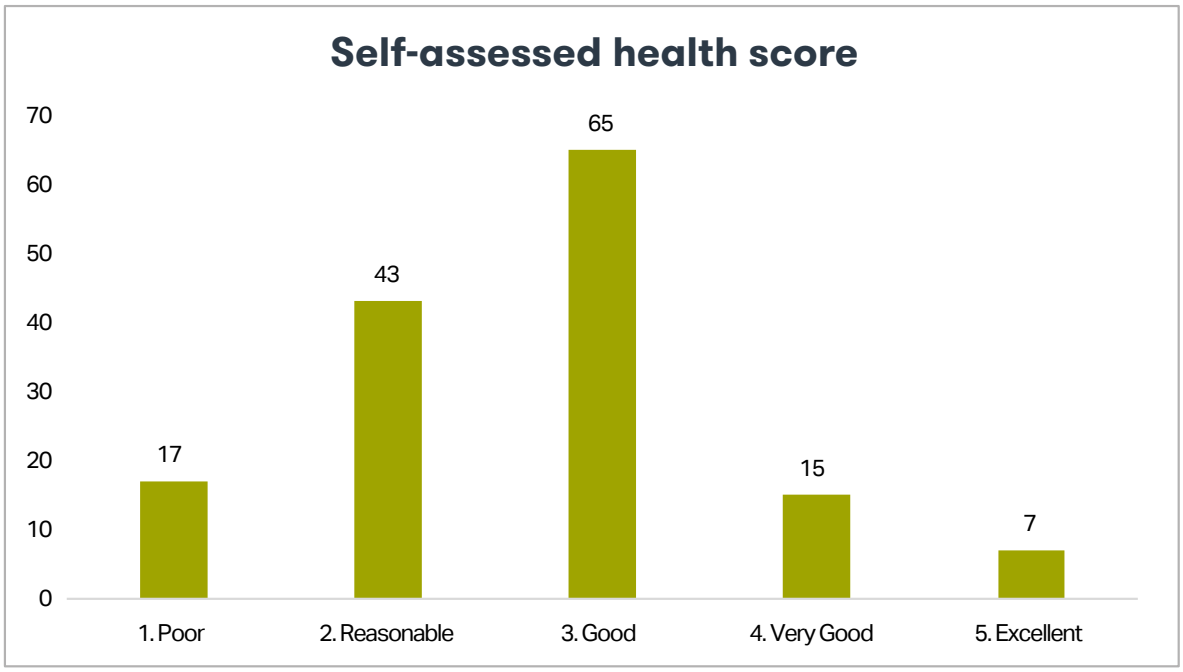

Figure 2: Health self-assessment scores of research respondents (Source: Survey)

Health Characteristics

Respondents were asked to rank their health based on a scale of 1-5. Where:

- 1 = poor ('slecht')
- 2 = reasonable ('redelijk')
- 3 = good ('goed')
- 4 = very good ('zeer goed')
- 5 = excellent ('uitstekend')

The average score for health was 2.7, representing a reasonable-to-good self-assessment of health (see: Figure 2). Besides the respondents surveyed by BTO Thuiszorg, many of the respondents were healthy and mobile enough to run their own errands. Data collection happened mostly in areas where high numbers of people would be moving through, such as shopping areas. These were also targeted as according to the Ouderenmonitor 2020, shopping is the most cited reason for seniors to leave the house and accounts for 39% of all trips.[25]

As for using care services, 76% of our respondents (n=154) made no use of any type of formal (paid) care such as health care and/or home/cleaning services.[26] 14% made use of household/cleaning services and 9% of professional care (provided by a registered care organisation/provider).[27] In the population as a whole this is 20% and 9%, respectively.[28]

In order to get a better understanding of the general health and vulnerability of respondents, they were asked to provide an overview of their medication use for specific health conditions. These conditions were chosen on the basis of their significance in increasing the level of vulnerability during periods of extreme heat.

As we can see in Table 5, 34% of respondents (n = 149) did not use any medication for the named conditions. The most prevalent medication use was for conditions relating to heart and cardiovascular disease (39%) and the lowest for neurological and psychiatric disorders (7%). Respondents could choose multiple answers.

25 Mobiliteit. **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**
26 4% of this group used a different form of assistance such as being cared for by a partner or their children.
27 Does not add up to 100% due to rounding.
28 In The Hague as a whole, 34% of seniors use home care to help them with their daily household tasks, however, only 60% of this care comes from formal care. Our research project survey focused on professional care. Therefore 20% represents the 60% of the total 34% who make use of this type of care. For details, see 11. Gemeenschap en Gezondheidszorg: **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**

Condition	Number	Percentage
Cardiovascular Disease	58	39%
None	50	34%
Diabetes mellitus	36	24%
Chronic Lung Diseases (e.g. asthma)	25	17%
Physical disabilities	25	17%
Disorders of the kidneys	11	7%
Neurological and psychiatric disorders	11	7%

Table 5: Medication use for various health conditions (Source: Survey)

Citizen's needs during periods of extreme heat

As part of the survey research we asked citizens to agree or disagree with 10 statements about what they were concerned about.[29] Multiple answers were possible. The results are presented in Table 6.

Statement: "during periods of extreme heat I am worried about…"	Is worried	Is not worried
…the cost of cooling myself	82%	18%
…**how** I can cool myself	81%	19%
…**if** I can cool myself	76%	24%
…that I'm going to have less contact with people	74%	26%
…my health	71%	29%
…my sleep rhythm	64%	36%
…how I feel	62%	38%
…how warm is it inside my home	62%	38%
…changes to my daily rhythm	59%	41%
…the period/length of heat	56%	44%

Table 6: Respondent concerns during periods of extreme heat (Source: Survey)

Whilst a majority of respondents were concerned about all of the statements, there are clear differences in concerns around dealing with heat and the perceived effect of heat on their health. We see that over 80% of respondents were concerned about the cost of cooling and how they can cool themselves. Costs were also one of the recurring themes that came up during the Focus Group Discussions.

This high level of concern around costs stands in contrast to other concerns: fewer respondents were worried about the effect of heat on their health (71%), their sleep (64%), and how they feel (62%). This is supported by discussions with experts and citizens in which it became clear that the risk signature of heat is often underestimated. We also observe in these findings that the chain of causation is broken. In other words, concerns around cooling strategies (how and if they can cool themselves) did not lead to an equal concern for their health or indicators of health, such as sleep patterns. The function of cooling is thus only perceived to be to feel more comfortable and not to prevent ill-health.

In general, respondents did thus not strongly equate heat, or the length of the period of heat (56%) with negative health outcomes, relative to other concerns. The relatively low frequency of heatwaves compared to daily concerns about health, finances, and loneliness means that it is not surprising that outside of periods of extreme heat, citizens are concerned about other factors in their lives. Acting on the associated risks of a heatwave at a personal level requires a level of saliency which fades away quickly after periods of extreme heat, as this interview quote of a care professional illustrates:

> **"That's always the way it is, if a topic isn't discussed for a year then it fades away. In practice we always see that there's a lot that needs to happen afterwards"**
>
> AT1_G1_15

29 Two versions of this question appeared, one asking respondents to choose the degree they agreed with the statement ('completely disagree', 'disagree', neutral, 'agree' and 'completely agree'). Those who answered 'agree' or 'completely agree' are counted as being concerned about the related statement. For brevity this was later adapted to asking respondents to choose the statements they agreed with.

Loneliness and heat stress (as a result of the heat island effect) are compounding factors which contribute to poor health outcomes. In The Hague (see: Figure 3) there is a high degree of overlap between the areas of heat stress and levels of loneliness in seniors over the age of 75. Despite health not being a top concern for respondents, we see that (increased) loneliness is almost matched (at 74%) as a concern for seniors.

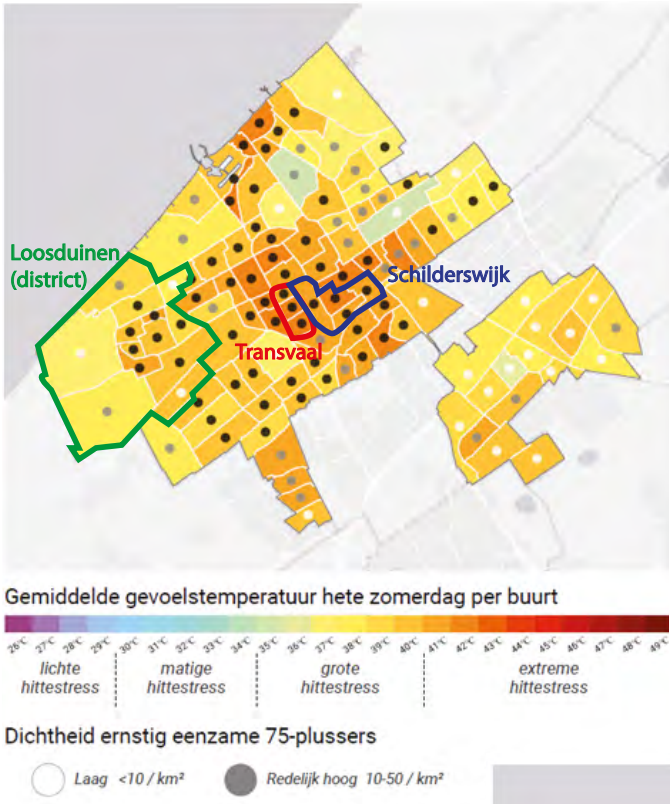

Figure 3: Heat stress and loneliness map for The Hague, 2020 with authors' addition of areas of geographical focus (Source: https://klimaatadaptatienederland.nl/)

Many independently living seniors cope with their daily lives but they become more vulnerable during periods of extreme heat. This is because many organisations have a summer break, and carers and family members are on holidays. This means that (in) formal support networks are weakened or break down during this period (Focus Group Discussions and AT3_G2_3). This point is illustrated in the following interview quote of a senior policy officer:

> **"The difficult thing is that exactly this group, the independently living seniors, who are usually self-reliant, become less self-reliant during hot periods, when normally the homecare will come. During the summer, the normal caregiver is on holiday and a replacement comes with whom there's no bond of trust. Normally a family member will come along, but they are on holiday, so there's then a period where no-one comes around. Yeah, those are definitely the places where you want to be. But who is responsible for that? "**
>
> AT3_G2_3

Activating and expanding the support networks during periods of heat reduces not only the vulnerability of seniors but also tackles the problem of increased loneliness. The need for support for those who are caregivers to their spouses or children was mentioned by those with these responsibilities (Focus Group Discussions). Their own needs become side-lined and secondary to those with an increased need. As seniors age, especially those with increased vulnerability, a pattern of self-neglect emerges (AT1_G1_7 & AT1_G1_15).

To conclude, the findings presented in this chapter show that citizens' needs to cope with the effects of heatwaves are complex and multidimensional, and that they are dependent on individual priorities and circumstances. We have noted the importance of (in)formal networks around senior citizens in addressing these needs, and that reducing their vulnerability requires a holistic approach based on citizens' personal experiences and (financial) capacities.

CHAPTER 4

Solutions: Adaptive Behaviour, Products, and Cooling Centres

In this chapter, we answer Research Question 3, 'What sustainable (frugal) solutions[30] exist to better meet vulnerable populations' needs during periods of extreme heat? To what extent can these be institutionalised?'.[31] This chapter is structured as follows. The first part provides an analysis of solutions developed by senior citizens themselves, including solutions linked to their adaptive behaviour during periods of extreme heat. These findings are derived mostly from the survey data.

The second part of this chapter introduces and explains a number of interrelated key dimensions of products and solutions that could be used to protect citizens. We focus here on solutions that are used indoors and in the senior's gardens and on their balconies. Public spaces (including green and blue spaces) are largely left outside of this analysis as they have already been widely discussed in the literature (especially that focusing on the greening of cities). An exception are the recently launched - and included in The Hague's Heat Plan - public "cooling places" (or cooling centres) as they are an existing practical solution that is available to seniors. Understanding why they might or might not be used by seniors during periods of extreme heat is a question of accessibility and user friendliness, which are two dimensions of the solutions discussed in this chapter. The analysis then focuses on the extent to which the solutions may be useful for protecting elderly citizens in The Hague against extreme heat. These insights are drawn from desk research, interviews, Focus Group Discussions (FGDs), and the Validation Workshop, and provide the basis for the policy advice in Chapter 6.

Solutions by citizens: adapting to heat

Despite the existence of a large number of practical solutions to reduce the negative effects of heatwaves (See: Appendix D: List of solutions), the most important ones all relate to changes in individual adaptive behaviour.

Table 7 depicts the survey results on the question what seniors do to cool themselves (with multiple answers possible). The most used strategy is to drink more water (71%), although it is not clear to what extent this is an effective strategy as seniors do perceive less of a thirst stimulus ('dorstprikkel') in general, making it hard to estimate how much seniors drink more than they normally would (AT6_G2_4, Validation Workshop). When asked what kinds of fluids they drink, most respondents said they stay away from alcohol and drink more water, soft drinks, or fruit juice.

Other strategies include the adaptation of clothing (wearing more loose-fitting clothing and lighter clothes; 70% and 56%, respectively); keeping the sun outside with curtains (60%) and sun screens (56%); and use of an electrical fan (50%). A surprising finding, also for the experts attending our validation workshop, is the limited usage of relatively simple and effective solutions, such as ventilation (e.g. opening windows at the relatively cooler moments of the day), and reducing your body temperature by using a footbath or wetting your face.

From the survey (n = 151) as well as discussions with seniors and experts there appears to be a lack of physiological knowledge on how the body works and how and why it should be cooled. For example, the relatively low percentages of respondents who seek out a cool space inside or outside of the home (29% and 15%, respectively) point to a limited awareness of the importance to provide the body with a break from coping with heat. We see that many more of the respondents attempt to cope with the heat in their homes rather than to reduce the physiological effect of the heat .

30 We operationalise frugality by exploring the complexity of solutions along the dimensions of 'affordability' (e.g., low cost), 'accessibility', and ease of usage (including the degree to which the solutions fulfil the users' needs –e.g., help seniors to keep themselves cool/ protect against heat). Dimensions adapted from Bhatti, Y., Basu, R., Barron, D. & Ventresca, M. (2018) *Frugal Innovation: Models, Means, Methods*, Cambridge: Cambridge Univ. Press; Weyrauch, T., and Herstatt, C. (2017) What is frugal innovation? Three defining criteria. *Journal of frugal innovation* 2(1): 1-17.

31 With 'institutionalised' we do not mean that solutions are centralised at the (municipal) governmental level but that municipal support is provided in terms of awareness, resources, and (in)formal structures.

Solution	Loosduinen	Schilderswijk	Other	Total	%
Drink more	59	23	22	104	71%
Wear loose(r) fitting clothing	59	21	21	101	70%
Keep the sun out with curtains	56	17	14	87	60%
Wear light coloured clothing	50	18	15	83	57%
Keep the sun out with sun screens/awning	59	13	10	82	56%
Use an electric fan	43	19	11	73	50%
Shower/bathe more often	27	15	11	53	36%
Stay in more often	19	15	15	49	34%[32]
Find cool spaces inside of the home	20	12	10	42	29%
Find cool spaces outside of the home	14	5	3	22	15%
Use a wet cloth	9	5	6	20	14%
Go out more often	9	7	1	17	12%
Use an air conditioner	8	3	4	15	10%
Keep windows and doors closed in the afternoon	6	3	0	9	6%
Wet your clothing	2	2	3	7	5%
Keep windows and doors closed in the morning	4	3	0	7	5%
Cool your feet (e.g. with a footbath or bucket)	4	1	2	7	5%
Use a parasol	1	3	1	5	3%
Keep windows and doors closed in the evening	2	1	1	4	3%
Wet your face with a spray bottle	0	0	2	2	1%
Keep windows and doors open in the morning	0	0	0	0	0%
Keep windows and doors open in the afternoon	0	0	0	0	0%
Keep windows and doors open in the evening	0	0	0	0	0%
Other	0	0	0	0	0%

Table 7: Seniors' self-reported solutions to coping with extreme heat (Source: Survey)

A further change in behaviour lies in making changes to their daily lives, as the following quote from an interview with care professionals illustrates:

> **"If you're older of course you can't cope as well [with heat]... You shouldn't then go out in full sun for a walk with your walker [rollator]. That's just not possible."**
>
> (AT4_G1_1)

From the survey results (see: Table 8), we see that respondents in both Schilderswijk and Loosduinen adapt their daily routines to cope with heat. Across the whole sample, 73% of respondents said they made changes to their daily lives. This was approximately the same share in both Schilderswijk and other areas (75%) and Loosduinen (73%). This means that there are approximately one-in-four seniors who do not change their daily routines during periods of heat. From the Focus Group Discussions, we found two explanations: 1) they do not have the opportunity to adapt their routine; or 2) they did not feel the need. This refers back to the support seniors need to meet their needs as well as the underestimation of the risks (See: Chapter 3: Vulnerable Populations' Characteristics and Needs).

32 When asked explicitly if they went outside less often during a heatwave 51% of respondents said they did. This was based on a lower number of respondents (n=109). We have chosen to present the number based on a higher response rate.

	Schilderswijk and Other Areas		Looduinen		Total	
	Yes	No	Yes	No	Yes	No
Do you make adjustments to your daily life during periods of extreme heat? (n = 150)	47 (75%)	16 (25%)	63 (72%)	24 (28%)	110 (73%)	27%)

Table 8: Seniors who make adjustments to their daily lives during heatwaves (Source: Survey)

When asked to qualify what changes they made to their daily lives, most respondents did not qualify the changes. Those who did mentioned the following aspects: take it easier/do less; stay indoors more; do tasks earlier in the day; go shopping earlier; don't cook in a warm kitchen; leave the house earlier and; let someone else do the shopping.

As previously discussed, shopping is the most common reason for seniors to leave their house.[33] It is therefore no surprise that the adjustments that seniors make to their daily lives reflect this. For example, that they do their shopping (and other daily tasks) earlier in the day or ask others to do their shopping. However, this is only possible for those with an existing network to assist them.

When asked about when they are most likely to go outside during a heatwave, a vast majority of respondents inherently understood that they should go outside in the morning and evening hours when it was cooler. This was supported by discussions during the Focus Group Discussions and discussions with survey respondents where it was widely considered to be 'common sense' that you adapt your day slightly. Those who did leave the house during the day did so to seek shade and cool down. Those who did not cited distance ("it's too far away") and their preference to be at home as reasons not to leave.

In sum, we see that seniors cope by leaving the house less often, but those who don't change the frequency of their trips outside still adapt their routine to the cooler morning and evening hours. We also observe a paradox in terms of the solutions that citizens use to cope with heat: On the one hand, they do have an inherent understanding of how to protect themselves (by going outside less often during the warmest period of the day, cooling themselves and their living spaces, and adapting their daily routine) but they do not often extend this to actions which actively aim to cool their internal temperature and thus reduce possible negative health outcomes.

33 Mobiliteit: **https://denhaag.raadsinformatie.nl/document/9989127/1/RIS308365_Bijlage_2_Ouderenmonitor_2020_definitief**

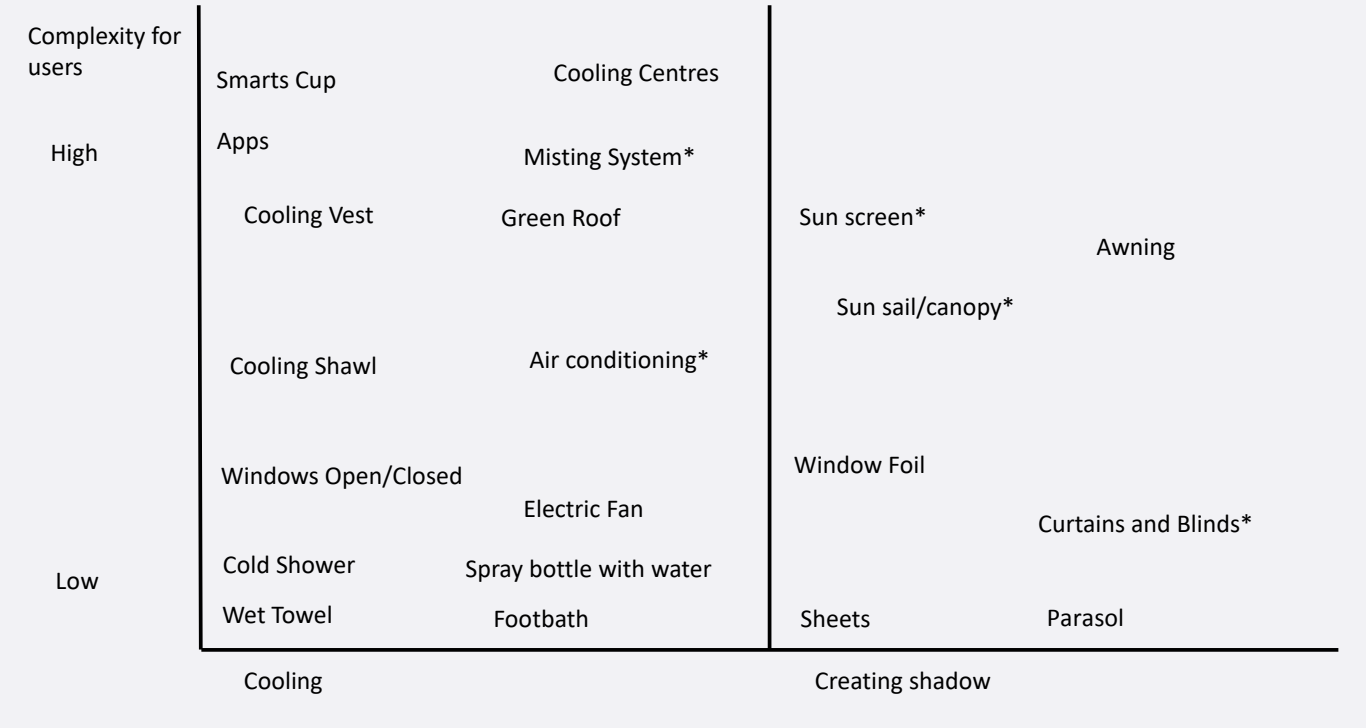

Figure 4 Typology of solutions (source: authors' own elaboration)[34]

Solutions

We now present the findings related to solutions that are either available on the market (products) or which can be easily 'constructed' by senior citizens themselves, using materials that are widely available. Figure 4 provides an overview of the various products and solutions. This is not an exhaustive list of solutions, but contains a wide variety of possible types of solutions which are indicative of the total range. These solutions can be categorised using two dimensions, namely, 1) function and 2) complexity.

The first dimension is the function of the solutions, these have been divided into "creating shadow" and "cooling". Creating shadow encompasses solutions that protect citizens against heat by limiting (direct) sunshine in their homes, on their balcony and/or their garden (including private and communal gardens). This category includes well-known solutions (e.g. sun screens, blinds, and parasols) and pragmatic solutions (e.g. using bed sheets) as well as lesser known products on the Dutch market, such as sun sails/canopies ('schaduwdoeken', see: Figure 5), balcony awnings ('klemluifel', see: Figure 8), and window foil ('raamfolie', see: Figure 6). Cooling includes respectively pragmatic solutions (e.g. using a wet towel and sponge), specific appliances (e.g. air-conditioning and electric fans), and relatively new products and services.

The latter include the Cobber cooling shawl ('afkoelsjaal' see: Figure 7), cooling vest ('koelvest'), misting systems ('nevel-systeem'), smart cup, and public cooling centres provided by the municipality of The Hague.

Figure 5 Canopy for providing shadow (© ZONZ sunsails)

34 Products with an asterisk can be used manually as well as controlled from a distance by either a specific remote control or by a smartphone app. Some products such as sun screens can also be fitted with sensors which allow automatic control based on changing weather conditions.

Figure 6 Window Foil (© De Kock Raamfolie)

The second dimension refers to the level of complexity of the solutions for seniors. Solutions are categorised as highly complex when they are: i) (too) difficult to access (or 'obtain') and/or ii) (too) complex for seniors to use (including solutions that do not fulfil their needs). Solutions with a low complexity are easy to use and to access for seniors, whereas solutions placed in the middle of the y axis are either complex in use but easy to access, or simple to use but difficult to obtain.

Based on the analysis of these dimensions (See: Appendix D: List of solutions for a more detailed analysis of each solution along the two dimensions), we introduce a number of interrelated key characteristics of the solutions which determine the extent to which they may be useful for protecting elderly citizens in The Hague against extreme heat. These dimensions inform our policy lessons (See: Chapter 5: Solutions: Increased Urban Resilience and Improved Communication and Chapter 6: Main Findings, Policy Recommendations, and Ideas for Future Research). In the remainder of this sub-section, these characteristics are presented and illustrated with relevant examples.

Figure 7 Cobber Cool Shawl (© Cobber by Vuursteker BV)

High accessibility and low-cost solutions

The need for low-cost solutions has become clear from both the survey as well as the interviews and FGDs. As mentioned earlier (see Chapter 3), the survey indicated that 82% of the respondents worry about the costs of keeping themselves cool, and this was the biggest concern among seniors.

Between the two study locations, there was no difference in concern regarding cost. One possible explanation for this is that although the average income in Schilderswijk (on average €29,600 per household per year with 65% of households being classed as low income) is relatively lower than that of Loosduinen (average household income of €38,800 with 44% low income households) the amount of income for seniors is more or less standardised.[35] For example, pensions are set by the government as are rent subsidies. As very few of our respondents owned their own house and the target group was predominantly over the state pension age, we can assume that respondents from both areas are making use of these government subsidies. Only those who continue working or have built up a private pension and/or have additional assets will, on average, receive a higher income. For these reasons, relatively few seniors live below the national poverty line. In 2016, in the country as a whole, there were 700,000 adults living in relative poverty of which only 93,000 were over the age of 65.[36] Relative to the rest of the population, seniors are less likely to live in poverty, although this changes as citizens get older. Until the age category 80-84 seniors experience lower rates of poverty than any other group. Only above this age does the rate rise above that of other adults (namely the 18-24 year olds).

Furthermore, we find that two relatively expensive solutions – sunscreens and air conditioning - are highly ranked (33% and 28% respectively) as options that our survey respondents would like to implement in their (communal) living space but costs and institutional barriers seem to be a restriction for these solutions. Roof insulation or having a green roof and changes to the roof were the third most popular adjustment (24%). Installing a green roof to protect those in the upper floors of apartment buildings also came up in several interviews (AT5_G2_6, AT5_G2_9, AT1_G1_15, AT3_G1_20) and during the Focus Group Discussions.

In our Focus Group Discussions and interviews the costs of sun screens and air conditioning were indeed mentioned as barriers for using these solutions. For instance, one interviewee (AT5_G2_9) stressed that sun screens are too expensive for seniors in social housing when they need to purchase them from their own budget. This was echoed during the Focus Group Discussions by multiple participants. Especially for seniors with a low income and health problems, it is a hard decision to invest their savings (or ask their children to chip in) for expensive devices (like a sun screen) that will probably benefit (in terms of duration of use) the next tenant more than themselves, given that they themselves might move to a care home or not be around much longer.

Likewise, seniors in the FGD mentioned that they do not have an air conditioning due to high energy cost for using this device. This point was also confirmed by an expert in our validation workshop who pointed out that (low income) population groups in Australia spend a lot of time in air-conditioned shopping centres during the hot summer months as the air conditioning at home is too expensive due to high energy costs.

In addition to costs, there are also other barriers that hinder usage of sun screens and air conditioning. Interviewees complained that they were not allowed to install sun screens for aesthetic reasons (i.e. having sun screens, especially of different types, may decrease the aesthetic value of buildings) or due to technical limitations (e.g. where it is too windy to install screens or awnings). Likewise, air conditioning is highly criticised due to the negative environmental effects (e.g. increasing global warming even further) and for making too much noise. The latter point was also confirmed by a participant in the FGD who was able to buy an air conditioning, but only has one in the living room as in the bedroom it would disturb their sleep.

To overcome the high costs (and other barriers) related to air conditioning and sun screens, our research has unveiled various affordable alternatives. For instance, instead of air conditioning, wet towels in combination with fans are regarded by experts as an effective measure to keep seniors cool (AT6_G2_4, Validation Workshop). However, as discussed above (Solutions by citizens: adapting to the heat) only a limited number of respondents use this option, which might be caused by a lack of awareness of this option. A simple (but not long-term) alternative to a sun screen was put forward by a senior we interviewed:

> **“Last year I hung a sheet over my shutter. That way at least my balcony still had sun and that was lovely. That means a difference of a few degrees [inside]”**
>
> (AT5_G2_9)

35 Source: **https://denhaag.incijfers.nl/dashboard/wijkprofielen/werk-en-inkomen**
36 **https://digitaal.scp.nl/armoedeinkaart2018/armoede-bij-kinderen-en-volwassenen/**

Figure 8 Balcony Awning (© ZONZ sunsails)

More durable solutions include window foil and adjustable canopies or sun sails ('klemluifels'), as discussed by another respondent:

"I know someone that has a simple system with a pole between the floor and ceiling, like you have in the shower. They've made a sunscreen from it, just two poles that you put between the balcony floor and, well you need something above you that you can put it between, and you have a simple awning. But yeah, it's simple and affordable without any construction that you have to fix to the wall. That way you can remove it easily, even in winter."

(AT4_G1_1)

This quote does not only illustrate that adjustable (even self-made) awnings are a relatively low-cost alternative – as is window foil - for fixed sun screens/awnings, but can also serve as a solution to overcome institutional barriers that prohibit installing sun screens on the outside of buildings. Moreover, the quote unveils the need for accessible and user-friendly solutions (e.g. solutions with a low complexity), the second key characteristic that we explain in the next subsection.

Easy-to-use solutions

The second characteristic is that solutions should be simple to use. Firstly, digital apps and other 'smart' solutions, such as a MyBeaker – a 'smart cup' with sensors and an app that registers how much seniors drink – are regarded as too complex for seniors. For instance, as one of our interview partners noted when speaking about a start-up challenge to come up with innovations to protect seniors from heat:[37]

"There were many other submissions that proposed things with heat resistant paint and a few with apps. A few where pretty smart but they were mercilessly shot down by the residential homes [representatives in the jury] because there's no point at all…something accessible [laagdrempelig] was also important"

(AT3_G1_2)

Also in other interviews and in the workshop, digital solutions were perceived as a barrier for seniors ("an app seems to be a barrier for our target group", Validation Workshop). A key cause is the low level of digital skills among seniors. Indicative is that one of the homecare organisations we interviewed mainly communicates by physical mail with their clients as only 2% of their 900 clients use e-mail (AT1_G1_15). However, in another interview (AT4_G1_1) it was mentioned that seniors are gradually improving their digital skills and are more frequent users of digital devices such as smartphones and computers.

Secondly, solutions must take into account the limited physical mobility of seniors. One key example of a solution that seems to make limited sense for seniors is a cooling vest that is regarded as too complex:

"That's the difficulty with this group. When you're talking about ease, putting [a cooling vest] on and off…seniors are just less mobile"

(AT2_G1_12)

37 See : **https://intergov.startupinresidence.com/nl/zuid-holland/hittestress-verzorgingstehuizen/brief**

Furthermore, it was stressed that cooling vests might be difficult to obtain for seniors. By way of comparison, citizens in Australia do not use cooling vests (AT6_G2_4, Validation Workshop). Simple alternatives for such cooling products are cooling shawls and wet towels, which are both easy to obtain and to use (both can be put on and taken off relatively easily).

Cooling Centres

Another solution that in many cases is too difficult for seniors to access is the cooling centres concept. As we explain in more detail in the next chapter (Chapter 5: Solutions: Increased Urban Resilience and Improved Communication), the municipality of The Hague has included a number of public buildings as cooling centres in its Heat Plan, where vulnerable population groups could go or be brought to on hot days in order to cool down for a few hours. However, interviewees and FGD participants stressed that seniors prefer to stay at home, inside their own homes (AT5_G2_9), and that due to their limited mobility, making a trip to a cooling centre may even increase the risk of dehydration (AT1_G1_15, Focus Group Discussions). A pragmatic alternative solution for cooling places implemented by seniors themselves is to simply sit down in the hallways of their buildings outside their own (hot) apartments (AT5_G2_9). However, this solution is not sustainable, as these spaces are not comfortable and bring noise issues with them. Proposed alternatives for the existing cooling place concept include either the creation of cooled spaces within apartment buildings (e.g. by installing an air-conditioner in the communal living room) or closer to the buildings where seniors live, or through organising transport from senior's homes to the cooling centres. The latter is a solution that has been implemented successfully in the city of Portland.[38] Cooling centres are currently included in the local Heat Plan of The Hague. However, they have not yet been activated, given that there was no heatwave in 2021.

Implementing Existing Solutions: Challenges and Opportunities

Overall, our interview partners seem to agree that making use of existing solutions makes more sense than inventing new solutions or by re-inventing the wheel. Entrepreneurs provide solutions that have already been on the Dutch market for a longer time (e.g., sun screens, window foil and air conditioning) or import solutions that have been successful in effectively protecting the elderly from heat in other countries with a longer experience with tackling heatwaves, such as cool shawls and sun sails/canopies that are used in Australia. Misting machines have been widely used on (restaurant) terraces in the USA and in Southern Europe, and can be adapted for use on private apartment balconies or terrasses in the Netherlands.

We found a few challenges to scaling up or mainstreaming some of these solutions. Firstly, many of them are highly individual and/or context specific, making it hard to quickly scale solutions to a large number of seniors. From the interviews and Focus Group Discussions, it has become clear that feelings such as feeling warm or being thirsty is dependent on factors such as health conditions, age, and migration background. For instance, seniors who immigrated from Suriname and participated in our FGD stressed that they do not perceive the Dutch summer as being warm and do not suffer much from heatwaves. Likewise, one of our interviewees mentioned that:

> **"What I've heard from people is that, on an individual basis, they've tried to do something by using electric fans with a wet towel. Just like they're used to doing when they are in the tropics. Turkish people are also used to dealing with heat. Moroccans also understand that they should keep everything closed as much as they can. I mean, everyone has their own experience and own solutions"**
>
> (AT_G2_9)

This points to the possibility of turning the challenge (i.e. different contexts and experiences) into an opportunity, where people in a neighbourhood can learn from each other.

Secondly, the housing situations are diverse, hindering application of uniform solutions. For instance, in our Focus Group Discussions seniors living on the ground floor indicated that they do not open windows to cool their rooms during the night for safety reasons. Likewise, seniors living on the top floor of flats cannot use a temporary canopy to create shadow due to the absence of a balcony above them to attach the product to; and seniors with their room facing south face a higher need to install sun screens or window foil than those with a room on the north. However, despite the individual and context-specific nature of the needs and therefore also solutions, it would be helpful if, for example, housing corporations would create an inventory of the needs of their tenants and consider buying equipment in bulk, given the high number of apartments in social housing blocks. Flexibility in purchasing is thus needed and central purchasing lists should be regularly updated, in consultation with the technicians, to reflect new solutions on the market.

38 We are grateful to Madeleen Helmer for sharing this insight with us, and the link to Multnomah County's report on its response to the June 2021 heatwave : **https://www.multco.us/june-2021-heat-event-preliminary-findings-and-action-steps**

A final challenge includes seasonality and the corresponding low saliency of heat as an issue for which there is a need for (structural, rather than ad-hoc) solutions. Obviously, all solutions presented here are seasonal products with a high demand during heatwaves. This may give some limitations in scaling solutions to more seniors and care homes, as put forward by a supplier of a shadow creation product:

“ We often see that we’ll be approached [in summer] by individual locations who say ‘we’re looking to create shade’. Then I’ll go there and ask what type of location it is, and usually they have multiple locations. Then you don’t hear much from them, and I don’t have time for active acquisition if I’m honest. That would have to happen in winter, because in summer we don’t have time for it, the customer always come to us. ”

Moreover, entrepreneurs of relatively new products on the Dutch markets, such as misting machines, cooling shawls, and sun sails/canopies face challenges in the low awareness levels of their products combined with the irregular need for such products due to the Dutch climate. For example, an entrepreneur of a new cooling product stated that:

“ In the Netherlands it was pretty unknown. [...] So we’ve had a really difficult period, it’s still the case actually, to get the product to be known by the consumers and business users. And that’s been a big obstacle. Because everyone who knew of it [the product], knew of it from abroad or they didn’t know about it at all. The people who knew of it from abroad said ‘yes but it’s the Netherlands, it always rains here.’ ”

(AT5_G_22).

We thus observe that the demand and supply of products which reduce the effects of heat seem to be out of sync with each other. Businesses have the chance to acquire clients and provide goods in the cooler periods, whilst the demand for these goods only happens in summer (and also not every summer). What we also see is that the demand is purely reactive to the temperature increases. It is often viewed as a short term solution, and not considered as a strategic priority by for example the procurement officers in housing corporations or care homes. More opportunities should also be created for entrepreneurs and the “demand side”, i.e. users or those acting on behalf of users, to meet. This was a suggestion made by the entrepreneurs participating in our Validation Workshop.

Conclusion

To sum up, we found that solutions fall broadly into two categories: solutions developed by senior citizens themselves, including solutions linked to their adaptive behaviour during periods of extreme heat, and those developed by local governments (e.g. cooling centres) and entrepreneurs (available on the market). As for the first, we found that more awareness is needed on the part of senior citizens in terms of how some behavioural changes affect their bodies and health. There is generally limited awareness regarding what they should do on a physiological level, whilst we see that many seniors see ‘staying cool’ as ‘common sense’. As for the second category, it is clear that in order to increase their usage and enable their institutionalisation, solutions need to be low-cost and easy-to-use. They should also be adapted to the local context. Yet we also identified considerable room for scaling up, especially if the supply and demand side gaps can be bridged by connecting users and suppliers off-season in the cooler months.

Solutions: Increased Urban Resilience and Improved Communication

In this chapter, we present the findings regarding increasing urban resilience and improving heat health risk communication between the municipality and senior citizens living independently. They answer **Research Question 4** which was formulated as follows: 'What can the municipality of The Hague do to address these needs - i.e. vulnerable populations' needs during periods of extreme heat - and thereby contribute to urban resilience? In particular, how could the municipality adapt the way it communicates on heatwave-related risks with vulnerable populations?' Given the policy-oriented nature of the research question and hence also findings, it is not possible to strictly separate the findings from the policy advice. We present our findings under two main headings, namely policy fragmentation and ownership; as well as communication.

Policy fragmentation and ownership

Before zooming in on The Hague, it is useful to briefly consider the wider policy context and existing knowledge on how Dutch municipalities are dealing with heat. The Dutch policy field is decentralised on many topics, including care. At the local level, there is a high level of fragmentation between public and private care service providers, as well as civil society and volunteer organisations. This point deserves to be emphasised here once more, given also the broader policy context and the Dutch government's explicit ambition to organise care increasingly in someone's own living environment, rather than in care homes.[39]

However, the bigger policy issue is around the ownership of heat as an urban resilience problem more broadly. The effects of heat are typically categorised in three policy areas: 1) public space; 2) buildings and homes (housing); and 3) health. [40]

With regards to public space, much research has already been done. For example, the Amsterdam University of Applied Sciences carried out a project on '*De hittebestendige stad*' (the heat-resilient city).[41] In addition, various maps to measure the Urban Heat Island effect[42], distance to cool places[43], and heat and loneliness maps have been developed.

The role of buildings and housing has also been studied quite widely, and policy recommendations regarding heat resilient (new) housing have been adopted by various provincial authorities and considered by housing corporations.[44] Similarly, solutions such as greening measures (for roofs, facades, and gardens) as well as more frequent ventilation, the use of sunscreens, electric fans and air-conditioning, and the painting of walls and roofs with white or special paint have been assessed and are being implemented.[45]

Finally, the impact of heat on health has also received attention at the national level, not least thanks to the national Heat Plan.[46] The national Heat Plan is first and foremost a communication plan focused on preventing and mitigating the negative health effects of heat. However, its implementation is quite top-down and one-directional (from the RIVM mainly to the national umbrella organisations in the area of health and elderly care, who are then supposed to disseminate the information further to their local branches) and it is not clear whether it is getting to hard-to-reach populations. Local heat plans are needed that partly reproduce the national Heat Plan at the local level, and which are based on a detailed knowledge of who the vulnerable populations are, where they live, and how best to reach them. In addition to health, local heat plans can (and perhaps should) also include the other two policy areas, i.e. public space and housing, and thereby reduce the policy fragmentation that we observe.

39 See the Dutch policy on 'topsectors' and the theme on 'Health and Care', Mission II: "Zorg op de juiste plek" (care at the right place), which says that 'in 2030, care is organized 50% more (or more often) in the own living environment (instead of in care institutions), together with the network around people (own translation). See **https://www.topsectoren.nl/missiesvoordetoekomst**

40 In Dutch these are the 3G's: gebied, gebouw, and gezondheid.

41 See **https://www.hva.nl/kc-techniek/gedeelde-content/projecten/projecten-algemeen/hittebestendige-stad.html**

42 See **https://klimaatadaptatienederland.nl/thema-sector/hitte/gevolgen-maatregelen/gebied/** for a good overview.

43 TU Delft published a study in 2018 focussing specifically on the Heat Island Effect in The Hague: **https://books.bk.tudelft.nl/press/catalog/book/isbn.9789463660037**

44 See for example the 'Convenant Klimaatadaptief Bouwen' by the Province of South Holland: **https://www.zuid-holland.nl/onderwerpen/klimaat/klimaatadaptief/**

45 See **https://klimaatadaptatienederland.nl/thema-sector/hitte/gevolgen-maatregelen/gebouw/maatregelen/** for a good overview.

46 See **https://klimaatadaptatienederland.nl/thema-sector/hitte/gevolgen-maatregelen/gezondheid/** for a short summary and relevant links.

The 'Handreiking Lokaal Hitteplan' (which we translate as 'Guidance Note Local Heat Plan') was developed by the Kennisportaal Klimaatadaptatie in 2019 and gives useful inputs for developing such local heat plans.[47] The Guidance Note emphasises the importance of collective ownership and provides a rough typology of relevant local stakeholders. Based on this Guidance Note, the municipality of The Hague has developed a first version of its local Heat Plan in the summer of 2021, which was published in February 2022. The research team has had the chance to review the plan. However, given that it was not yet public at the time of writing, this report does not explicitly refer to it. Nevertheless, the recommendations in Chapter 6 are meant to help the municipality to further develop its local Heat Plan.

Strong coordination and buy-in from relevant stakeholders are the main factors that will determine whether any local heat plan is successfully implemented, in order to create strong ownership of heat as (at least) a public health issue.

In our research, we have identified the following actors that need to be involved and co-own the problem at the local level:

- Provincial Government[48]
- Local Government
  - Resilient The Hague
  - Relevant policy teams (e.g. Dienst Onderwijs, Cultuur en Welzijn (Education, Culture, and Wellbeing); Stedelijke Ontwikkeling (Urban Development), Stadsbeheer (City Management)
  - Regional Health Service (GGD)
- Senior Citizen Consultants ('ouderenconsulent')
- Volunteer organisations (e.g. PEP Den Haag)
- The Red Cross
- Local healthcare services (e.g. local pharmacies and General Practitioners)
- Care (and wellness) organisations
- Care (residential) homes
- Housing Corporations
  - Building manager ('huismeester')
  - (Central) procurement department
  - Housing Consultant(s)
- Resident associations
- Renters associations
- Neighbourhood associations
- Community centres
- Senior citizens' interest groups (e.g. De Ouderenbond) and knowledge platforms (e.g. Kennisplatform monitor Seniorvriendelijk Den Haag)

Our interviewees also emphasised the importance of getting strong and clear commitments from the various stakeholders, especially during the summer holidays:

> **"In my opinion it's about the commitment from the different parties and that you really agree with each other [who will do what] and make this explicit in the period when lots of people are on holiday [...] what will you do about it as an organisation, as a senior citizen consultant, as a volunteer organisation, how are you going to ensure that you will reach the seniors? What are you going to agree with each other? That's where you really need the commitment and concrete agreements about what you will do concretely"**
>
> (AT2_G1_21)

While an analysis of the exact nature of the relationships between all these stakeholders is beyond the scope of this study, it is clear that there needs to be a problem owner ('probleemhouder') (AT3_G1_2) with the necessary (legal, political) authority and (financial, human) resources to get other relevant actors to deliver on the tasks and agreements made in the local Heat Plan. Such a 'hitte regisseur' or coordinator (or 'heat tzar') should have ownership over the topic and bring the different departments together but should not 'belong' to any one of the existing departments with their individual policy mandates. Instead they should sit across the different policy domains. However, the Resilient The Hague team could be an exception here as its mission cuts across different policy fields. What is central is that those in a coordination role are provided the means and mandate to enact this role.

47 The Guidance Note is available at: **https://klimaatadaptatienederland.nl/hulpmiddelen/overzicht/lokaal-hitteplan/.** It refers to the Delta Plan on Spatial Adaptation 2018, which is a collective plan of the municipalities, district water boards, provinces, and the central government, aimed at rendering the Netherlands climate-proof and water-resilient, and includes combatting heat stress. See **https://klimaatadaptatienederland.nl/en/policy-programmes/delta-plan-sa/**

48 Heat as it pertains to health is not formally a competency of the provincial government, but heat stress is. Province Zuid-Holland, as well as other provinces, have included heat within their climate adaptation ambitions. For example: Brabant (**https://www.provincie-utrecht.nl/sites/default/files/2020-12/Verslag%20hittestress%20bijeenkomst%20provincie%20Utrecht.pdf**) and Utrecht (**https://www.klimaatadaptatiebrabant.nl/k/n442/news/view/3262/2025/concrete-richtlijnen-voor-een-hittebestendige-stad.html**)

The current list of core partners in the local Heat Plan could be extended by including the private sector in the form both of entrepreneurs that could market affordable and accessible innovations to those who need them, but also in the form of shopping centres or shop owners who would like to offer their air-conditioned spaces as cool spaces during a heatwave (currently, the local Heat Plan for The Hague only mentions public institutions such as churches, libraries, universities, and community organisations as 'facilities partners'). Institutional care providers could also be involved more, given the very high level of interest they showed in the start-up in residence competition on heat innovations mentioned earlier (over 50 expressions of interest to pilot the innovations were received, whereas only three residential care centres could participate; AT3_G1_2).

The fact that heat is addressed along three separate policy areas (i.e. public space; buildings and homes; and health) is not helping to create stronger ownership. For example, it would be useful if the local Heat Plan would also include agreements to involve the stakeholders who are working on cooling the public space as well as those working on cooling individual homes, and to do so year-round.

The policy framework is now also conducive for doing so, as the "Wegwijzer Den Haag Klimaatbestendig" has been approved ('vastgesteld') by the municipal council in May 2021. This framework includes a section on heat with concrete targets as well as design guidelines (such as 'green, unless').[49] Some financial resources were released to work on pilot projects to test various approaches to capture rain water and create shade etc., but so far they have been quite limited in number (AT3_G1_18 and AT3_G1_20).

The lessons learnt and innovations from the pilot projects should also be reflected in the manual of public space ('handboek openbare ruimte') which is a legally binding document and which makes it possible to mainstream certain innovations such as water-permeable pavements. As our interviewee put it:

> **"If it's included in the manual of public space, then it becomes an official policy measure and you don't hear anyone complain anymore. But before you get there it's a very long process. [...] And the manual needs to be supported by the managers of the public space. [...] They have the most benefit or trouble [from the innovations]."**
>
> (AT3_G1_18)

A mindset change is thus needed among the civil servants and external parties that are tasked with developing concrete projects and interventions to cool the city, as they have to let go of traditional design principles and think from the perspective of heat and climate change adaption (AT3_G1_20).

In the coming years, the ambitions and conditions for climate resilient management of public space will be evaluated, and the insights will be used to formulate the framework for climate change adaptation in the strategy on spatial planning and the environment ('omgevingsvisie') of The Hague. The latter will then in turn represent the starting point for the spatial and environmental plan ('omgevingsplan') which will make the ambitions and conditions legally enforceable. This policy and administrative process is complemented by fine-grained studies that have been commissioned by the municipality on vulnerable locations with regard to flooding, drought but also heat and which will come out in the course of 2022 (AT3_G1_18 and (AT3_G1_20).

We should keep in mind though that this policy process as well as the multi-year budget allocation depends on the agenda and outlook of the new council (after the municipal elections in March 2022). In other words, local politics do matter in determining the saliency of this issue (AT3_G1_18 and AT3_G1_20). Here, framing the issue more as one of a 'safe and healthy city' instead of 'only' a climate resilient one, could be useful. As one interviewee told us:

> **"No-one gets enthusiastic about climate adaptation on its own, but probably they do when it's about getting nice, attractive outdoor spaces with good sitting spaces and playgrounds and less mess on the street."**
>
> (AT3_G1_20).

Nevertheless, from a policy point of view, the fact that 60% of the public space in The Hague is private property[50] means that the municipality has limited reach in its actions ('beperkt handelingsperspectief'), as it cannot force individual owners or housing corporations to modify the facades of their houses or buildings. For example, such modifications could consist of using certain heat-resistant materials, or to design the interiors in such a way as to protect vulnerable populations (AT3_G1_18). Here, municipal subsidies (e.g. for green roofs) are important, as they could potentially bridge this gap. Unfortunately, it seems that such subsidies for green roofs "are spread unequally over the city and do not end up in neighbourhoods where they are

49 Available at: **https://denhaag.raadsinformatie.nl/modules/13/Overige%20bestuurlijke%20stukken/670166**
50 Wegwijzer Den Haag Klimaatbestendig 2021, p. 16.

most needed" (AT3_G2_16). The neighbourhoods that have the highest potential are typically those with the lowest average incomes.[51] One explanation is that the population living in more affluent areas is typically better at identifying and making use of subsidy opportunities (AT3_G1_20). They also, relatively, have more disposable income to maintain the subsidised investment. As for municipal subsidies to install sun screens on windows, seniors and organisations we spoke to were not aware of any available subsidies. If no current subsidy options exist, then it would be interesting to explore whether the Social Support Act ('Wet maatschappelijke ondersteuning' or WMO) can be used to subsidise this.

Although we are aware that adding all these elements of urban resilience to the local Heat Plan would render it even more complex, we do believe that they should at least be mentioned and worked on as much as possible year-round, and relevant stakeholders added to the current lists of heat and 'target group' experts. Making public spaces and housing (in addition to health) part of the local Heat Plan would also increase opportunities for citizen participation and the continuous dialogue that are needed to: 1) communicate the saliency of the issue and the need for behavioural change to decrease their vulnerability to heat; and 2) to transform the current sense of powerlessness we found among inhabitants (especially those living in social housing) to change their circumstances ("it is what it is, and it's only going to get worse" , Focus Group Discussion) into a sense of agency. An important starting point for this is to help people to become aware of affordable and user-friendly solutions, subsidy possibilities, and networking opportunities, amongst other options. For this, effective communication is needed.

Communication

We divided the findings on communication into three topics, the 3Rs: risk, role, and relief. With risk we mean the risk signature of heat, or how deadly it can be. Role encompasses how citizens can be activated to reduce possible harm during periods of heat as well as the role of professionals and (in)formal networks. Finally, with relief, we will discuss the communication of the possible solutions, many of which are already in the local Heat Plan. These three themes cover the three main findings of the research: Firstly, seniors are not fully aware of the risk that heat poses to their health. Secondly, at all layers of social organisation (formal and informal; citizens and administrators; expert and layperson) we see fragmentation and a lack of awareness of who does what; and finally, seniors are not sufficiently aware of the existing solutions available to them. In addition, trusted and neutral organisations can communicate more effectively with them.

Communication: Risk

> **"Maybe if there's a heatwave then there's a sort of team that goes through the neighbourhood and goes to the [senior] apartment buildings and knocks on the door and asks 'how much water have you drank?', 'is everything okay?', 'it's going to be really hot this week'. Something that actively approaches seniors"**
>
> (AT4_G1_1)

From the survey data, conversations with seniors, interviews, and Focus Group Discussions we found that seniors do not see themselves as vulnerable to heat. The mental shift that is needed from associating heat with only positive outcomes (holidays, terraces, beaches, and sitting on the balcony) to understanding its risk signature is equal to a cultural change. Communicating risk to those who do not see themselves as vulnerable to that risk arguably requires the use of trusted authoritative actors within their existing network. Although we could not collect direct empirical evidence to substantiate this point given the lack of a heatwave in 2021, we do have some evidence from our fieldwork. Response rates and willingness to participate in our research were much higher when a trusted actor mediated between us as researchers and the target group, by translating the message into something relevant within their specific context. Stichting Christiaanhof Ouderenzorg played this role with their members and as a result, we were able to successfully arrange three Focus Group Discussions. In stark comparison, only one participant attended the Focus Group Discussion arranged at another location (a public library) where there was more distance between organiser and (potential) participants. The need for personal contact and communication was emphasized by several interviewees (AT4_G1_1, AT5_G2_9, AT2_G1_12). For example, information on heat health risks could be provided through meetings at the market, community squares, etc. This can also reduce barriers to do with the relatively low literacy rates in some of the areas we studied (AT1_G1_15). However, this is difficult in the summer periods when these authoritative and trusted actors go on summer break or holiday. Low levels of digitalisation within the target population compound this problem, as much of this kind of communication has moved online for ease and speed of dissemination.

51 See p. 43 in Aart Jan Leonard van Gameren (2020), 'Green roofs and climate resilience in The Hague: Spatial, financial & stakeholder analyses'. A thesis submitted to Leiden University & Delft University of Technology in partial fulfillment of the requirements for the degree of Master of Science in Industrial Ecology, 19 August 2020, Available at **https://repository.tudelft.nl/islandora/object/uuid%3A55e92e3c-0b43-4064-8cbb-2ea1d1e1e068**

We understand that the municipality is planning to send a personal letter to all 75-plussers in The Hague in 2022, should there be a heatwave. The loneliness, literacy, and institutional concerns outlined earlier mean that this should be delivered in good time, possibly with a reminder. This is to ensure that if it does not get picked up by the intended recipient, other channels (family, organisations, carers etc) are able to communicate the central message.

Furthermore, we observed that access to information about the risk of heat for vulnerable populations was limited. Sources of information such as the local paper ('wijkkrant') are vital for informing citizens (AT1_G1_7, AT5_G2_9). We heard that this is often not delivered anymore. The lack of information was compounded by the COVID-19 pandemic which saw reduced contact hours with trusted figures such as the building manager ('huismeester') of apartment buildings as they were less present for the sake of their and others' safety.

These trusted actors might also be better able to estimate the possible risks to members in their network, and they can recontextualise the possible risk to individuals in their communication with each other. This is especially the case with increased likelihood of personal neglect as citizens age (AT1_G1_15). Increased (and contextualised) communication within smaller groups of citizens from a trusted source can increase the saliency of the topic.

The messenger should be neutral, especially in areas where there is a high level of distrust towards the (local) government. Organisations such as the Red Cross play an important role as a neutral messenger, but "grassroots messengers" can also fulfil it, as this quote illustrates:

> **"For example, certain resident associations also have street representatives, those are people that keep an eye on what's happening in the street and they keep contact"**
>
> (AT1_G1_7)

In addition, the role of informing citizens about heat health risks should be decoupled from informing them on any other issues that individuals may have (AT3_G2_16). As part of the survey research, respondents were asked if they had anything else they would like to add about the topic of heat. Those who answered this question were more inclined to mention other topics such as immigration, local services, and problems they were having in their neighbourhood.

The core of this communication approach should be to communicate at the 'closest' possible level to the individual (AT1_G1_7) and preferably in an interactive way. This can range from organised events (for example, such as those organised by Stichting Christiaanhof Ouderenzorg)[52] to increasing awareness by (small) business owners who in some cases may be the only contact some seniors have in a day. Other possible channels of communication include shopping centres, libraries, and lunchrooms, as well as more traditional partners such as community centres (AT1_G7_7). The newsletters from housing corporations to their tenants could include items on heat. In some cases, the GGD is already sending content to the central communications offices but it is important that it is included at the right time and tailored to the local context of each location (AT4_G1_1).

However, an important caveat is that the messaging from the municipality to these trusted and neutral actors should be institutionalised to ensure that correct and complete information is provided (AT3_G1_2). For example, the Dutch meteorological organisation (KNMI) and national health institute (RIVM) keep close contact regarding early heatwave warning based on the publicly available weather and climate model ('klimaatpluim'), which provides a forecast of the expected temperature for the coming weeks (AT3_G2_3).[53] The decision of whether or not to activate the national Heat Plan is based on this early warning system. In case this is not yet happening systematically, incorporating something like this in messaging and local newspapers could provide citizens the chance to prepare on time for possible extreme heat events and increase the saliency of doing so.

Finally, much of the discussion in this section has focussed on communication towards seniors. However, we see that interest for this topic and the associated importance is relatively low within government and civil society groups, as well as with citizens. At the municipal and provincial levels there seems to be generally limited knowledge and awareness and as a result the few people who work on this topic struggle to get attention for it (AT3_G2_16, AT2_G1_21). For example, at the municipality and GGD, there is a limited number of people working on this topic and due to staffing changes, some of the core of this team have recently left. Ensuring institutional awareness within the governance structures is key to succeeding in raising public awareness.

52 For example, an information evening was organised with the police about how seniors can keep their homes safe from being broken into in the summer months when people tend to leave their windows open during the day/evening.

53 Weather and climate plume: **https://www.knmi.nl/nederland-nu/weer/waarschuwingen-en-verwachtingen/weer-en-klimaatpluim**

Communication: Role

As already discussed in Chapter 3, the low saliency of heatwaves as a health issue (with regards to vulnerability) means the topic needs to be recontextualised. This section looks at the role of different actors in the communication of heat related risks.

First of all, the role of existing actors (the municipality, carers, pharmacists, doctors etc) needs to be better communicated. In the Focus Group Discussions and conversations around the survey research it became clear that many citizens do not know to whom they can turn for advice during heatwaves. Only 13% (n=126) remember seeing advice from the municipality during the heatwave(s) of 2020. This is compounded by only 25% of citizens remembering seeing any advice on how to keep themselves safe during a heatwave from any/all possible sources. This advice was mainly received through traditional media (e.g. local newspapers), TV, and online sources.

Secondly, our interviewees also stressed the need to involve the seniors' social networks. 'Looking after each other' is mentioned as a key adaptation measure in the national Heat Plan, but this message has not yet been internalised by the people in the seniors' social networks. Whilst seniors themselves may not see themselves as vulnerable, we see that many of them do see *others* as more vulnerable. This is especially important for independently living lonely seniors who have limited contact with family members and friends. A key concern is that family members may live too far away and/or may be too busy (AT6_G2_4, AT5_G2_9). A simple solution to overcome this problem might be using informal social contacts:

> **"Maybe a really simple advice is this: during a severe heatwave knock on your neighbour's door. Think about your uncle that lives in a flat in Amsterdam by himself. Think about the vulnerable too, or just go and have a chat to see how they're doing. That's a very simple advice"**
>
> (AT6_G2_4).

In addition, formal solutions have been developed to tackle this problem. For example, the Red Cross set up a system of 'contact circles' in which people call (lonely) seniors to provide daily contact.[54] During a heatwave, this is extended to include checking whether or not seniors drink enough (AT2_G1_12). Likewise, one of the care organisations we interviewed has set up a database with clients who have limited social contact in their direct surroundings. During heatwaves, these clients receive extra visits by care workers to secure that the clients 'are doing fine' (AT1_G1_15). In France, there is a register of vulnerable citizens who are contacted during a heatwave to remind them of the precautionary measures they can take to protect themselves from the heat and to check that they are okay. Citizens can add themselves or, with permission, they can be added by someone else, for example, a homecare or healthcare worker (AT6_G2_17 and AT7_G2_11). Whilst this may ensure increased coverage of vulnerable groups, this solution requires quite some logistics. Based on our findings, we also advocate for ensuring existing networks are fully activated.

Furthermore, many healthcare workers and informal carers are not trained on the risks or solutions during periods of extreme heat (AT1_G1_7). We found that there is a skills/knowledge gap between experts on this subject (including policy officers and researchers) and those who are in close and regular contact with seniors (e.g. family members with care responsibilities). In addition to this knowledge gap, there is an institutional gap in that there is limited cooperation between those actively working on this topic and those with increased access to the seniors. Organisations such as PEP Den Haag, which work with volunteers in elderly care, as well as other parties such as the Red Cross, could play an important role both in bridging the knowledge gap (through trainings etc) as well as the institutional gap by clarifying and contextualising the key role of those around vulnerable populations.

Approaching the important role of local actors as an institutionalisation question provides the opportunity for a standardised approach to heat. Such an approach could consist of encouraging organisations who have frequent and regular interactions with vulnerable populations to create their own Heat Plan where they consider what they are able to do during periods of extreme heat and how they can communicate with those in their networks. For example, an organisation could commit to providing an airconditioned/cooled common area where a movie or games afternoon could be organised to allow vulnerable people to cool themselves and reduce the physiological effects of heat. An organisation's own Heat Plan would detail who would be responsible, who is available (i.e. not on holiday), and who would communicate with members.

54 https://afdeling.rodekruis.nl/haaglanden/onze-activiteiten/goed-voorbereid/#contactcirkel

Communication: Relief

Communication around adapting behaviour at home, which forms the basis of much of the city's Heat Plan includes poster campaigns, personal letters to 75+ old seniors, flyers, and activities organised by the Red Cross to bring the information closer to citizens. Some of them – especially the very interactive ones - seem to have been quite successful. For example, according to an interviewee from the Red Cross,

> **"We made flyers with how many glasses [of water] someone drinks per day, you tally them [tick them off], and that worked really well"**
>
> (AT2_G1_12)

And:

> **"...we do it [i.e. provide advice on what you should and shouldn't do during a heatwave] in the form of bingo, and that really helps. With bingo you use images and sounds. In the Schilderswijk it was really interactive"**
>
> (AT2_G1_12).

However, given that this study did not specifically target the participants in these events, it is not clear if citizens are brought close enough to the topic through them. But it seems plausible that by using trusted and neutral organisations with a low (social) distance to seniors, the possible solutions can be more effectively communicated. This communication requires a standardisation of message (e.g. about cooling centres) were the same core message in terms of risk, role, and relief is being widely communicated. In addition, given the migration background of many vulnerable seniors, it is important to ensure that this information is provided in a range of relevant languages in order to reach those for whom Dutch is not their native language.

Conclusion

This chapter reviewed the issues around policy fragmentation and lack of ownership of heat as an urban resilience problem and presented local heat plans as possible policy solutions. It also mapped all relevant stakeholders and pointed to the importance of a well-resourced and legitimate central coordinator who can ensure buy-in and strong commitments from the stakeholders. We also explored the potential role of private sector actors and residential care homes in such local heat plans, and the usefulness of involving municipal architects and managers of the public space year-round. Next, the findings pointed to issues of framing heat in such a way as to ensure commitment also from political actors, as well as of ensuring that municipal subsidies for building adaptation reach the target group. As for our findings on heat health risk communication, the report focused on three overlapping themes which we refer to as risk, role, and relief. An overarching finding is the need to reduce the knowledge gap and distance between 'heat professionals' and those (trusted and neutral) actors who are in close and regular contact with vulnerable seniors so that the available information reaches them in a timely and easily accessible manner.

CHAPTER 6

Main Findings, Policy Recommendations, and Ideas for Future Research

This chapter provides an overview of the main findings from the research project, the key policy recommendations for the municipality of The Hague, and some ideas for future research. We have focused on the policy recommendations in the table below (pp. 39-43) but the findings can be found in the 'Why?' column as they provide the rationale for the individual recommendations. In addition, we have tried to categorise the recommendations according to the four main phases of the local Heat Plan (preparation, pre-warning, warning, and evaluation phases), so it is easier to anticipate the actions needed for their realisation.

The local Heat Plan is one tool in the municipality's broader approach to heat, and the scope of this research is broader than only the Heat Plan. To be clear, the findings in this chapter do not constitute an evaluation of the current Heat Plan, which has yet to be implemented. The recommendations are aimed at improving the general resiliency of The Hague as it relates to heat and provide possible avenues for strengthening the municipality's approach, whether it is through the Heat Plan or outside of it. When a finding relates only to the Heat Plan, we have tried to clearly indicated this.

The central and most urgent advice is to identify, appoint, and resource a Heat Plan coordinator ('hitte regisseur') or unit in charge to ensure problem ownership and to bring the different departments in the municipality and other actors together. As we wrote in Chapter 5, this role should not 'belong' to any one of the existing municipal departments or the GGD with their individual policy mandates. Instead, the position should sit across the different policy domains. Locating this position in the Resilient The Hague team could be ideal, as its mission cuts across different policy fields. What is central is that the person(s) in this coordination role is provided the means and mandate to enact this role, in order to get concrete and clear commitments from all actors mentioned in the local Heat Plan.

While our recommendations are directed towards the municipality of The Hague, many other actors are of course needed to implement them (see the list in chapter 5).

Preparation Phase (autumn/winter)

	WHAT? (POLICY RECOMMENDATIONS)	WHY? (FINDINGS)
1	**Invite additional stakeholders to join the local Heat Plan**	
1A	• Involve private sector actors such as entrepreneurs that could market affordable and accessible innovations to those who need them • Involve (the association of) managers of shopping centres or shop owners who would like to offer their air-conditioned spaces as cool spaces during a heatwave • Involve more institutional care providers • Involve more civil servants/professionals working on urban design solutions to cool the public space and buildings, both at municipal and provincial levels	The current Heat Plan includes an initial list of core partners to ensure its implementation. In future years, the local Heat Plan can be extended in its reach and scope. For example, we found knowledge and institutional gaps between experts and those working directly with independently living seniors, as well as between the private sector and other stakeholders.
2	**Improve public and private living spaces for the elderly so they are ready for the summer heat**	
2A	Create awareness and lobby for the inclusion of the lessons learnt and innovations from the urban design/cooling pilot projects in the manual of public space ('handboek openbare ruimte') and other building design guidelines, use the results of the commissioned studies on vulnerable locations (responsible: city planners/urban designers and managers of public space).	The manual is a legally binding document and makes it possible to mainstream or scale certain solutions. A mindset change is needed among the civil servants and external parties that are tasked with developing projects and interventions to cool the city, as they have to let go of traditional design principles (interviews).
2B	Lobby for building regulations to change and for housing corporations to review their guidelines regarding the installation of solutions designed to help tenants cope with heat. The latter needs to happen also at the national level since many housing corporations work in different municipalities.	Seniors are not allowed to install sun screens for aesthetic reasons or due to technical limitations.
2C	Encourage housing corporations (in cooperation with subject experts, e.g. 'ouderenconsulenten') to create an inventory of the needs of their tenants and consider buying equipment in bulk, given the high number of apartments in social housing blocks, and to update their purchasing lists regularly.	Housing and heat stress situations are diverse, and compounded by the individual and context-specific nature of the needs and therefore also solutions. But: economies of scale are still possible.
2D	Organise matchmaking meetings between entrepreneurs with heat-reducing solutions for buildings and housing corporations/landlords/ building managers and procurement officers, also during off-season. Consider involving resident associations so the solutions are tailored to specific needs.	We found three challenges to do with matching supply and demand. First, low awareness levels of existing products on the demand side. Second, seasonability, which refers to the high and sudden demand for products in the summer, but entrepreneurs lack time then to actively approach new markets such as care homes. Third, fragmentation: entrepreneurs do not know whom to approach within housing corporations or care homes with the authority to make purchasing decisions for one or more buildings. Related to this is the challenge that each organization has a different structure.
2E	Evaluate green roof subsidy scheme and raise awareness among low-income target group, or redesign it. Support those in need in applying for the subsidies by helping with writing the applications etc.	60% of the public space in The Hague is private property, municipality has limited reach in its actions and depends on others to implement changes. Roof insulation or having a green roof and changes to the roof were the third most popular adjustment (24%) which citizens would like to make to their living space (survey, interviews and FGDs). Evidence that green roof subsidies are mistargeted (studies and interviews). Sense of powerlessness among inhabitants (especially those living in social housing) to change their circumstances.

2F	Consider giving subsidies for installing sunscreens or awnings to, and raise awareness with housing corporations/landlords about them.	The cost of cooling and how to cool themselves are seniors' top two concerns (survey). Two relatively expensive solutions – sunscreens and air conditioning - are highly ranked (33% and 28% respectively) as options that our respondents would like to implement in their (communal) living space (survey). Sun screens are too expensive for seniors in social housing when they need to purchase them from their own budget. Especially for seniors with a low income and health problems, it is a hard decision to invest their savings (or ask their children to chip in) for expensive devices (like a sun screen) that will probably (in terms of duration of use) benefit the next tenant more than themselves, given that they themselves might move to a care home or not be around much longer (interviews and FGD).
2G	Provide subsidies to create cooled spaces within apartment buildings (e.g. by installing an air-conditioner in the communal living room) Explore whether the WMO budget can be used for this. Note: Cooling centres are an important element of the current Heat Plan which are due to be piloted. However, in 2021 they were not activated due to the lack of extreme heat and/or a heatwave. Raise awareness among relevant stakeholders and support them in applying for the subsidies.	Seniors prefer to stay at home and have limited mobility and an increased risk of dehydration when going/travelling to a cooling centre (interviews and FGDs).
3	**Ensure political commitment to heat-health mitigation measures**	
3A	Create buy-in and ownership amongst political parties and actors in the post-election municipal council and administration by framing the issue more as one of a 'safe and healthy city' instead of 'only' a climate resilient one.	Successful inclusion of heat as a priority in the policy process as well as a multi-year budget allocation depends on the agenda and outlook of the new council (interviews). Re-framing is necessary as "climate change adaptation" does not motivate these actors sufficiently (interview).

Pre-warning Phase (spring)

	WHAT? (POLICY RECOMMENDATIONS)	WHY? (FINDINGS)
4	**Strengthen communication on heat-health risks with target group**	
4A	Identify and partner with trusted and neutral actors, such as the Red Cross or street representatives of resident organisations, pharmacists, GPs etc. Communicate heat health risks for general health outcomes and importance of risk factors (age, health, medication use). Do this at the 'closest' possible level to the individual, e.g: • through meetings at the market, community squares and activities of relevant organisations (e.g. Red Cross bingo meetings), as well as shopping centres, libraries, and lunchrooms, and community centres; • through newsletters from housing corporations to their tenants to include items on heat; as well as • through traditional media including newspapers and TV (check if local newspaper is actually delivered to target population) Messaging from the municipality or GGD to trusted and neutral actors should be institutionalised to ensure that correct and complete information is provided, i.e. including heatwave forecast in early warning communication (based on national level system), and provided in the most important languages used among the vulnerable population At the same time, communicate on simple adaptive behaviour solutions.	Heat, or the length of the period of heat are not strongly equated with negative health outcomes, relative to other concerns (survey). The function of cooling is only perceived to be to feel more comfortable and not to prevent possible ill-health (survey). Lack of physiological knowledge on how the body works and how and why it should be cooled (interpretation of survey results). Difficulties in the summer periods when authoritative and trusted actors go on summer break or holiday mean more and alternative communication channels are needed (interviews). Many citizens do not know to whom they can turn for advice during heatwaves (FGD). Low levels of digitalisation within the target population means traditional media and in-person communication is preferable (interviews). But: local newspaper is often not delivered anymore (interviews). Increased (and contextualised) communication within smaller groups of citizens from a trusted source can increase the saliency of the topic. Limited usage of relatively simple and effective solutions, such as ventilation and reducing your body temperature by using a footbath or wetting your face (survey). Low percentages of respondents who seek out a cool space inside or outside of the home (survey). Paradox: On the one hand, seniors do have an inherent understanding of how to protect themselves (by going outside less often during the warmest period of the day, cooling themselves and their living spaces, and adapting their daily routine) but they do not often extend this to actions which actively aim to cool their internal temperature and thus reduce possible negative health outcomes (interpretation of survey results).

5	**Facilitate peer learning on adaptive behaviour and solutions**	
5A	Organise peer learning events to exchange simple adaptive behaviour solutions (responsible: community centres).	Feelings such as feeling warm or being thirsty are dependent on factors such as health conditions, age, and migration background. Seniors with different migration background could benefit from sharing their solutions with each other (interviews).
5B	Organise peer learning events where those who have installed window foils and adjustable canopies or sun sails ('klemluifels') and those who are using cooling shawls and wet towels show them to others (responsible: Housing managers, building managers, resident associations, entrepreneurs).	Adjustable (even self-made) awnings and window-foil are a relatively low-cost alternative for fixed sun screens/awnings, and can also serve as a solution to overcome institutional barriers that prohibit installing sun screens in/outside buildings (interviews). Limited awareness and use of cooling shawls and wet towels, which are both easy to obtain and to use (survey).
6	**Strengthen awareness, solidarity, and knowledge networks**	
6A	Raise awareness among the broader public to check on elderly people in their network during a heatwave – similar as during the start of the COVID-19 pandemic.	Family members live too far away and/or are too busy, high levels of loneliness, self-neglect (interviews).
6B	Establish and/or activate formal solidarity networks such as the Red Cross's contact circles, encourage home care providers to set up lists of most vulnerable clients and check on them more often, consider establishing a public registration system (as in France).	Family members live too far away and/or are too busy, high levels of loneliness, self-neglect (interviews).
6C	Bridge the knowledge and social gap between those (policy-advisors, researchers, entrepreneurs etc) working professionally with heat and those working with seniors on a daily basis, e.g. by resourcing relevant organisations (such as the Red Cross or PEP Den Haag) to give relevant trainings to volunteers/staff.	Many healthcare workers and informal carers are not trained on the risks or solutions during periods of extreme heat.
6D	Encourage organisations who have frequent and regular interactions with vulnerable populations to create their own heat plan (which details what they are able to do during periods of extreme heat and how they will communicate with those in their networks).	Lack of physiological knowledge on how the body works and how and why it should be cooled on the part of seniors (survey). Many healthcare workers and informal carers are not trained on the risks or solutions during periods of extreme heat. Lack of accessible and familiar cool spaces for seniors – organisational heat plans could include providing an airconditioned/ cooled common area for movie or games afternoon to allow vulnerable people to cool themselves and reduce the physiological effects of heat.
7	**Get logistics and communication around cooling centres in place**	
7A	Identify and partner with possible cooling centres which are closer to the buildings where seniors live.	Seniors prefer to stay at home and have limited mobility and an increased risk of dehydration when going/travelling to a cooling centre (interviews and FGDs). Cooling centres are due to be implemented with the activation of the local Heat Plan. The efficacy or usage of such spaces is currently unclear as the current Heat Plan has not yet been activated.
7B	Approach shopping centre owners/managers to create dedicated spaces for seniors to cool down and include them in the Heat Plan.	Seniors do not have an air conditioning due to high energy cost and negative environmental impacts as well as noise issues (FGDs).
7C	Organise transport from senior's homes to the cooling centres and communicate to seniors about their existence and accessibility.	Seniors prefer to stay at home and have limited mobility and an increased risk of dehydration when going/travelling to a cooling centre (interviews and FGDs).

Warning Phase (summer)

	WHAT? (POLICY RECOMMENDATIONS)	WHY? (FINDINGS)
8	**Ensure timely communication with seniors about how to mitigate effects of heatwave**	
8A	Send a personal letter to all 75-plussers in good time, with sample letter shared with all home care organisations and relevant building managers.	Loneliness, literacy, and institutional issues mean it is important to ensure that if information does not get picked up by the intended recipient, other channels (family, organisations, carers etc) are able to communicate the central message.
8B	Establish local neighbourhood teams that go through the neighbourhood and checks on residents in the [senior] apartment buildings.	Seniors do not see themselves as vulnerable to heat (all data sources). The risk signature of heat is underestimated due to positive cultural associations with warm/hot weather (interviews). Trusted authoritative actors within seniors' existing network are best placed to communicate with seniors and change their minds (fieldwork experience and interviews).
9	**Facilitate additional cooling opportunities**	
9A	Encourage supermarkets to re-introduce early shopping hours for seniors/everyone (as used during the pandemic).	Seniors go shopping earlier when it is cooler, they understand the need to avoid going out of the home during the warmest parts of the day (survey and Focus Group Discussions).

Evaluation Phase (autumn/winter)

	WHAT? (POLICY RECOMMENDATION)	WHY? (FINDING)
10	**Conduct Evaluation of the local Heat Plan**	
10A	Evaluate the local Heat Plan comprehensively, i.e. both its design and implementation, and consult with a wide range of stakeholders, and use lessons learnt to adapt the Heat Plan.	Strong coordination and buy-in from relevant stakeholders are the main factors that will determine whether any local heat plan is successfully implemented, in order to create strong ownership of heat as (at least) a public health issue (interviews).

Ideas for Future Research

During the interviews, we asked about the interviewees' ideas for future (applied) research projects. Their answers can be grouped into four main topics.

The first idea is **to take stock of and share best practices across municipalities/provinces in the Netherlands with regard to local heat plans**: "To have a big portfolio with lots of ideas on what you can do locally […], because I feel that every municipality wants to re-invent the wheel" (AT3_G2_3). This could focus only on municipalities with local heat plans (and hence compare their content but also evaluate what works when, for whom, under what conditions?), or also include those who do not. This could be extended to the **European level**, to facilitate inter-European learning exchange, also on how to identify vulnerable people. For example, what can we learn from the experience with the register of vulnerable people set up in French municipalities? A sub-question for the Netherlands and Europe would be to ask, 'How can climate adaptation/urban planning be integrated in local heat plans so they go beyond being mostly heat health communication plans?'

A second idea would be to zoom in on **urban planning policies and activities undertaken in Dutch municipalities**, including The Hague, and evaluate design guidelines and interventions such as pilots properly in order to contribute to the strategy on spatial planning and the environment ('omgevingsvisie') and the spatial and environmental plan ('omgevingsplan').

A third idea could be to **focus on residential care institutions** to better understand how the purchasing trajectory ('inkooptraject') work, and how product innovations can make it into the purchasing lists ('inkoopassortiment') at the central level. Another aspect with regard to residential care homes is to test our initial assumption that they all have good local heat protocols by examining the existing policies and protocols, including building guidelines. For example, a survey of 50 such homes could be done across the country to look at differences between organisations and building types, and inventorise the training needs of staff working there. This is a relevant issue as residential care homes have a duty of care, even if a heat protocol is not obligatory (AT3_G2_3).

A fourth research topic within **elderly care** is to look at the **potential of digitalisation to overcome fragmentation in the sector**, and to save costs and to increase time for care.

Appendices

Appendix A: Research Team

Main researchers

Dr. Sylvia Bergh: Principal Investigator. Senior Researcher (The Hague University of Applied Sciences) and Associate Professor in Development Management and Governance (International Institute of Social Studies, Erasmus University Rotterdam).

Ashley Richard Longman, MSc: Researcher and Project Coordinator (The Hague University of Applied Sciences)

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Appendix B: Interview participants (in alphabetical order)

Alper Atebag, Founder and Director (Misting-pro)
Acelya Bilisik, Zorgmanager (BTO Thuiszorg)
Coen Bongers, Postdoc onderzoeker (Radbound UMC)
Annabel Buzink, Emergency Response Coordinator/Coordinator Hulpverlening Haaglanden (Het Rode Kruis)
Sander Brinkman, Policy advisor climate change adaptation (Gemeente Den Haag)
Joanne Cnossen-Bruins, Beleidsadviseur (GGD Haaglanden)
Gerry Fens, Woonconsultant (Woonzorg)
Peter van den Hazel, Research and Practitioner (GGD Midden & SCORCH Project)
Werner Hagen, Coördinator Nationaal Hitteplan (RIVM)
Anne-Marie Hitipeuw-Gribnauw, Clustercoördinator Kennis en Innovatie (Ministerie van Infrastructuur en Waterstaat)
Nina van Haren, Stadsdeelmedewerker Welzijn, Jeugd en Participatie (Gemeente Den Haag)
Aleksandra Kazmierczak, Expert in environment, human health and well-being (European Environment Agency, European Climate and Health Observatory)
Wiebke Klemm, Policy Advisor Climate Change Adaptation (Gemeente Den Haag)
Mark de Kock, Director (De Kock Raamfolie, BV)
Karine Laaidi, Chargée de projet climat et santé (Santé Publique France)
Sandra Menken, Trainer Adviseur (PEP Den Haag)
Peter Ogterop, Director (Zonz BV)
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Gerardo Sanchez, Expert Environment, Health, and Wellbeing (European Environment Agency)
Christine Scheurvogel, Voorzitter (Bewonerscommissie Paulas Potterstraat)
Bernadette Sleurink, Director (Vuursteker BV)
Kirsten Vanderplanken, Senior Research Fellow (University of Antwerp & SCORCH Project)
Janine Vervoordeldonk, Senior beleidsadviseur gezondheidsbevordering (GGD Haaglanden)
Rozanne van Vliet, Manager (Permavoid)
Duncan Waardenburg, Projectleider Startup in Residence Innovatieteam (Provincie Zuid-Holland)

Appendix C: Survey Design and Modes

MODE	CONSIDERATIONS	ADMINISTRATION
Mode 1: Long version (including qualitative questions)	Where citizens could sit and conform to COVID-19 measures	Self-administered and researcher administered depending on respondent needs. Administered at: Stichting Amadeus (Loosduinen), Haags Ontmoeten Tabitah (Loosduinen), Bewonerscommissie Paulas Potterstraat (Schilderswijk), Buurthuis Mandelaplein (Transvaal).
Mode 2: Principle version	Shortened version after pilot due to considerations of length, asking senior citizens to stand for long periods of time.	Researcher administered on street in Loosduinen and Schilderswijk
Mode 3: Shorted version	Shortened version due to burden on home care ('thuiszorg') employees	Conducted by BTO Thuiszorg in October both face-to-face and telephonically with clients.

Appendix D: List of solutions (in Dutch)

OPLOSSING/ PRODUCT	OMSCHRIJVING	BESCHIKBAARHEID/ FYSIEKE VERKOOP-KANALEN	FUNCTIE: SCHADUW CREATIE / COOLING	COMPLEXITEIT EN GESCHIKTHEID VOOR SENIOREN	BRONNEN
Air conditioning ("Airco")	"Apparaat dat de luchttemperatuur en luchtvochtigheid reguleert. Hiermee vergemakkelijkt het afgifte van lichaamswarmte aan de lucht via straling en zweetverdamping en kan het lichaam warmte makkelijker kwijt. Airco veroorzaakt vaak wel opwarming van de omgeving en moet spaarzaam ingezet worden".	Bekend product en wijd verkrijgbaar in electronica winkels, zoals Media markt	Cooling	Medium. Gemakkelijk in gebruik en breed verkrijgbaar, maar hoge gebruikskosten	Interviews, FGD, Eggen (2021)[55]
Cobber afkoelsjaal	Sjaal die na een half uur in koud water als afkoelsjaal om hoofd, hals of pols gebruikt kan worden. Kan eventueel ook als ice pack of hot pack gebruikt worden Winnaar "Startup in Residence Intergov challenge Provincie Zuid-Holland 2020"	Gespecialiseerde outdoorwinkels, medische winkels (bijv. MediPlus), en bij importeur: www.coolcoolestcobber.nl Wijd gebruikt in Australie, relatief nieuw op de Nederlandse markt	Cooling	Medium. Product kan gemakkelijk om- en afgedaan worden. Product is relatief nieuw en nog niet wijd verkrijgbaar, nog redelijk onbekend, geen standaardproduct bij verzorgingstehuizen	Interviews
De Vliegende Hollander	Vochtafstotende planten die voor temperatuurreductie in de kamers kunnen zorgen Winnaar Startup in Residence Intergov challenge Provincie Zuid-Holland 2020	Niet op de markt	Cooling	Hoog. Nog in testfase en nog niet op de markt	Interviews
(Rol)gordijnen en jaloezieën	Creëren van koelte in huis door tegen houden van zonlicht Zo laag mogelijk houden temperatuur in leefomgeving om hittestress te beperken en herstel te bevorderen	Standaard product dat (bijna) iedereen in huis heeft Verkrijgbaar bij woonwinkels, bouwmarkten en warenhuizen	Schaduw creatie	Laag. Gemakkelijk in gebruik en wijd verkrijgbaar	Eggen (2021)
Groen dak en (binnen)tuin	Een innovatief irrigatiesysteem zoals Permavoid (http://www.permavoid.co.uk/) kan regenwater vasthouden en gebruikt worden als koelsysteem tijdens hitte. Dit systeem kan geïntegreerd worden op groene daken, in (dak)tuinen en in infrastructuur.	Door specialist bedrijven/ bouwmarkt	Cooling	Hoog. Ondanks subsidies relatief hoge kosten. Geen standaard product dat overal aangelegd kan worden – o.a. afhankelijk va dakconstructie.	Interviews

55 Eggen, G. (2021) 'Heat and health', presentation shared at the online training for volunteers and student assistants involved in the project "Heatwaves and vulnerable populations in The Hague", 6 August 2021.

Klemluifel	Losse zonwering dat tussen vloer en plafond van balkon of dakrand wordt ingeklemd	Winkels als Lidl	Schaduw creatie	Medium. Simpel te installeren en verkrijgbaar bij discounters. Product echter nog niet heel bekend	Interviews
Koele douche	Koel stromend water neemt snel veel warmte over van de huid en draagt hiermee bij aan verlaging van de kerntemperatuur.	Standaard product dat iedereen in huis heeft	Cooling	Low. Gemakkelijk in gebruik en standaard in huis	Eggen (2021)
Koelvest	Vest die het lichaam afkoelt. Er zijn verschillende kant-en-klare koelvesten – hydrogel (koelen middels verdamping; vest moet voor gebruik 20 minuten in water gelegd worden); DryCool (hier wordt water ingegoten); PCM (cool pads in het vest). Daarnaast zijn er vesten waar gebruiker zelf verkoelende elementen in kan stoppen. Het Klimaatverbond heeft in 2020 een koelvestchallenge gehouden gericht op het ontwerpen van een eigen koelvest	Online verkrijgbaar bij speciale winkels zoals koelvesten.nu Gebruikt voor bepaalde beroepen (bijv. zorgmedewerkers, in de industrie en bouw), maar twijfel over nut voor 'gewone' burgers	Cooling	Hoge complexiteit. Product is complex om te gebruiken (moeilijk aan-/uit- trekken), zeker voor hulpbehoevende senioren. Product is nog redelijk onbekend en alleen verkrijgbaar bij specialistische zaken.	Interviews en https://www.uitblinkersindezorg.nl/product/koelvest-tegen-de-hitte/ https://klimaatverbond.nl/project/koelvestchallenge/
Laken	Stuk textiel dat gebruikers voor het raam of boven het balkon/tuin kunnen spannen om schaduw te creëren	Standaard gebruikersproduct dat 'iedereen' in huis heeft	Schaduw creatie	Laag. Product dat 'iedereen' heeft. Snelle oplossing, maar geen structurele oplossing	Interviews
Natte doek	"Natte doeken vergroten het vermogen tot verdamping zonder zweten en koelen daarmee de huid. Hiermee dragen ze bij aan een verlaging van de kerntemperatuur." Vochtig maken van de huid met een natte doek is ook effectief	Standaard gebruikersproduct dat 'iedereen' in huis heeft	Cooling	Laag. Makelijk product dat 'iedereen' heeft. Door experts als zeer effectief verkoelingsmiddel voor senioren beoordeeld	Interviews, Eggen (2021)
Natte spons	Vergelijkbaar als natte doek	Standaard gebruikersproduct dat 'iedereen' in huis heeft		Laag. Makelijk product dat 'iedereen' heeft. Door experts als zeer effectief verkoelingsmiddel voor senioren beoordeeld	Interviews
Parasol	Uitklapbaar doek waaronder de gebruiker schaduw heeft.	Wijd verkrijgbaar bij tuincentra, woonwinkels en bouwmarkten	Schaduw creatie	Laag. Makkelijk in gebruik en breed verkrijgbaar.	Auteurs
Plantenspuit met water	"Kleine waterdruppeltjes verdampen makkelijk bij contact met warme huid. Hiermee vergemakkelijken ze hitteverlies via de huid en verlagen ze de kerntemperatuur. Gebruik wel altijd schoon kraanwater en ververs het water regelmatig om infectierisico te voorkomen"	Wijd verkrijgbaar bij tuincentra, woonwinkels, huishoudwinkels, warenhuizen	Cooling	Laag. Gemakkelijk in gebruik en breed verkrijgbaar	Eggen (2021) en eigen elaboratie

Raamfolie (of 'glasfolie')	Zonnewerende folie dat op de binnen- of buitenkant van ramen geplakt wordt. In tegenstelling tot schermen en gordijnen een preventieve werking doordat het er al zit voordat het zonnig wordt. Oorspronkelijk uit de ruimtevaart. Grote diversiteit, o.a. in materiaal - plastic en in textiel – en in mate van lichtdoorlatendheid	Bouwmarkten, woonwinkels en specialisten zoals de Kock raamfolie	Schaduw creatie	Laag. Relatief eenvoudig aan te brengen. Redelijk wijd verkrijgbaar, alhoewel iets minder bekend dan gordijnen	Interviews en https://dekockraamfolie.nl/ https://www.hema.nl/wonen-slapen/gordijnen/raamtextiel?gclid=EAIaIQobChMII8fBwc3g9AIVmbt3Ch3WqQ9kEAAYAiAAEgI5-_D_BwE&gclsrc=aw.ds
Ramen open/ dicht	"Open ramen en deuren als de buitentemperatuur 's avonds en 's nachts daalt" "Als de omgevingstemperatuur daalt kan het lichaam warmte makkelijker kwijt. Luchtbeweging door (natuurlijke) ventilatie bevordert afvoer van vochtige lucht door zweet en koelt de huid verder af. Afkoeling in de nacht kan slaapverstoring beperkt houden (mits ramen veilig open kunnen)."	Standaard in elk huis, al kunnen niet alle ramen in dezelfde mate geopend worden	Cooling	Medium. Beschikbaar in elk huis; gemakkelijk te doen. Echter afhankelijk van raamsysteem en niet geschikt in onveilige buurten.	Eggen (2021), FDG
Schaduwdoek	Doek dat bevestigd wordt aan vier palen of andere vaste objecten. Grote diversiteit in type doeken (vorm en dikte) en bevestigingssystemen	Tuincentra, woonwinkels en specialisten, zoals zon.nl Algemeen product in Australie, toenemende bekendheid in Nederland	Schaduw creatie	Middel. Relatief simpel te installeren. Relatief onbekend bij verzorgingstehuizen en ook nog niet algemeen bekend bij particuleren	Interviews
Slimme beker en apps	Slimme beker met vocht inname meter. Dit product is preventief voor uitdroging. Gekoppeld aan een app zodat naasten en zorgpersoneel het ook in de gaten kunnen houden	Via website My Beaker. Onduidelijk of het product al op de markt is	Cooling	Hoog. Slimme beker alsmede apps worden als te complex gezien door experts. Tevens is het product onbekend, moeilijk verkrijgbaar en is het niet duidelijk of het al op de markt is.	Interviews, workshop en https://www.zorgvisie.nl/slimme-beker-meet-vochtinname
Ventilator	Electrisch apparaat dat de luchtstroom reguleert "Luchtbeweging vergemakkelijkt hitteverlies door het afvoeren van vochtige lucht dicht bij de huid (door zweet) en bevordert daarmee afkoeling via de huid"	Wijd verkrijgbaar bij woonwinkels, tuincentra, warenhuizen	Cooling	Laag. Eenvoudig in gebruik, relatief goedkoop en wijd verkrijgbaar	Interviews, FGD, Eggen (2021)
Vernevelings-systeem	Apparaat dat door nevel voor verkoeling zorgt Op te hangen aan overkapping, parasol, galerij, schutting, etc.	Bouwmarkten en specialisten als Misting-pro en Gardena Wijd gebruikt in warme landen (o.a. Verenigde Staten en in Zuid-Europa), maar relatief onbekend in Nederland	Cooling	Hoog. Product is nog redelijk onbekend en nog niet wijd verkrijgbaar. Gebruik relatief makkelijk, maar installatie wellicht wat moeilijker	Interviews

Voetenbad	Afkoelen van het lichaam middels de voeten in een emmer of teil met water “Koel water neemt snel veel warmte over van de huid en draagt hiermee bij aan verlaging van de kerntemperatuur”	Standaard gebruikersproduct dat ‘iedereen’ in huis heeft	Cooling	Laag. Standaard product. Kan eventueel wat zwaar en onhandig zijn voor minder mobiele senioren	Auteurs, Eggen (2021)
Zonnescherm	Ophaalbaar scherm dat de zon tegenhoudt	Bekend product. Verkrijgbaar bij bouwmarkten, woonwinkels en specialistische winkels	Schaduw creatie	Medium. Bekend product en eenvoudig aan te brengen en te bedienen. Echter relatief hoge kosten en niet overal toepasbaar door technische of institutionale barrieres.	Interviews

Appendix E: Original Quotes

In order of appearance are the quotes in their original formulation.

Page 11:
“Jongens, natuurlijk het Hitteplan is heel mooi en iedereen moet beschermd worden. Mensen weten echter niet bij wie ze terecht moeten, ze hebben geen klein(kinderen), ze spreken de taal niet, die groep blijft altijd achter met alles, met ontwikkelingen, met nieuws, met onderzoeken. […] We kregen ook weer signalen over eenzaamheid.” (AT1_G1_15)

Page 13:
“In Schilderswijk en Laakkwartier wonen mensen met een migratieachtergrond, veel van deze mensen komen uit een heet land. Veel van deze mensen hebben niet door dat het klimaat in Nederland wat hitte betreft anders is dan in het land waar ze vandaan komen. In Nederland gaat het leven door. Het is anders hier, er is geen siësta, er wordt op geen enkele manier rekening gehouden met de combinatie van werk en hitte. […] je zit in een heel dichtbevolkt gebied met heel veel gebouwen en stenen, waardoor het nog warmer is met opwarming en dergelijke. Bovendien is het ook nog zo dat bij die doelgroep de prioriteiten heel anders liggen [wijzend naar geldzorgen etc].” (AT2_G1_12)

Page 20:
“Dat is eigenlijk altijd zo, als een onderwerp een jaar niet aan de orde is dan zakt het heel snel weg. We zien altijd in de praktijk dat achteraf heel veel moet gebeuren.” (AT1_G1_15)

Page 21:
“Het lastige is dat juist die groep, de alleen wonende en thuis wonende, die normaal zelfredzaam zijn, maar tijdens hitte periodes verminderd zelfredzaam zijn, waarbij normaal gesproken de thuiszorg komt. In de zomerperiode is de thuiszorg en vaste partner op vakantie en komt er een vervanger waarbij geen vertrouwensband is. Normaal gesproken komt een oom of een tante een keer langs, alleen die zijn op vakantie, dus er komt een periode niemand langs. Ja, dat zijn wel de plekken waar je er ook voor wilt zijn. Maar wie gaat daarover?” (AT3_G2_3)

Page 23:
“Er zijn ook ja, het hoort er ook bij als je ouder bent dat je er ook minder goed tegen kan. En dan moet je het ook niet op gaan zoeken, je moet niet in de volle zon gaan willen wandelen met je rollator. Dat kan gewoon niet.” (AT4_G1_1)

Page 27:
“Ik heb vorig jaar een laken voor mijn, over mijn luik dinges gehangen. Zodat mijn balkon ten minste werd beschenen en dat was verrukkelijk. Dat scheelt ook weer een aantal graden.” (AT5_G2_9)

Page 28:
“Ik weet hier heb je iemand die heeft zo’n heel simpel systeem met, zoals hier in je douchehoek een stang die je tussen je vloer en je plafond […] daar hebben ze dan een zonnescherm van gemaakt twee eigenlijk stokken heel eenvoudig die zet je op je balkonvloer en tegen het nou het moet natuurlijk wel iets van een of bind of om een balkje boven waar je tussen kan spannen met een heel simpel uitvalscherm […] Maar ja het is simpel of goedkoop en met geen constructie die je in de muur of zo moet bevestigen, dus je kan dat simpel weer weghalen, ook in de winter.”(AT4_G1_1)

Page 28:
“Er waren veel andere inzendingen die veel deden met hittewerend verf en een aantal met apps. Een aantal waren vrij slim maar die werden door de woonzorgcentra genadeloos afgestraft omdat het totaal geen zin heeft […]. Ook iets dat heel laagdrempelig was is belangrijk.” (AT3_G1_2)

Page 28:
“Een app lijkt me wel drempel verhogend voor onze doelgroep” (Validation Workshop).

Page 28:
“Ook het aan- en uittrekken als je het hebt over het gemak, dit is ook niet wat er in de challenge naar voor gekomen, er was ook iemand ingeschreven met de vesten, maar dat het veel te veel impact heeft maar ook gewoon, ouderen zijn toch gewoon minder mobiel.”

Page 29:
“En wat ik van mensen gehoord heb, is inderdaad individueel, dat ze er wat aan gedaan hebben door ventilatoren te gebruiken en met natte handdoeken te werken. Zoals ze ook zelf gewend zijn als ze in de tropen zijn. Turkse mensen zijn ook gewend om hitte te kunnen verdragen. Marokkaanse mensen weten ook wel, ze houden alles zoveel mogelijk dicht. Ik bedoel, iedereen vormt zo ze eigen ervaring wel en oplossingen.” (AT5_G2_9)

Page 30:
“Vaak merken we dat we nu per locatie benaderd worden, van ‘he we zoeken schaduw’. Dan ga ik erheen en vraag ik rond wat voor locatie hebben jullie, meestal hebben ze meerdere locaties. Ik heb ook geen tijd om daar actief acquisitie op te plegen moet ik eerlijk zeggen. Dat zou dan eigenlijk in de winter moeten, want in de zomer hebben we daar geen tijd voor, de klant meldt zich vanzelf bij ons.” (AT5_G2_8)

Page 30:
"Kijk, in Nederland was het heel onbekend […]. Dus we hebben wel een hele moeilijke fase gehad om het product dus ook, nu nog steeds, richting die bekendmaking en de kennismaking met de gebruikers en ook met ondernemers. En dat was een heel obstakel. Want iedereen die het kende die kende het via het buitenland of ze kenden het niet. Die mensen die het dus van het buitenland kenden, die hadden ook zoiets van ja, maar het is Nederland hier regent het altijd." (AT5_G_22)

Page 32:
"Maar volgens mij gaat het daar vooral om de commitment van de partijen dat je echt met elkaar dit afspreekt en juist ook benoemd in de periode dat veel mensen op vakantie zijn, […] wat ga je daar dan aan doen als organisaties, als ouderenconsultent, als vrijwilligersorganisatie, hoe zorg je dat je die ouderen wel gaat bereiken? Wat ga je dan afspreken met elkaar? Daarin heb je echt het commitment nodig en echt concrete afspraken van wat gaan we dan precies doen." (AT2_G1_21)

Page 33:
"Als het eenmaal in het handboek openbare ruimte vaststaat is het een maatregel en hoor je niemand meer piepen. Voordat je daar bent is het een heel lang proces. Het handboek openbare ruimte moet door de beheerders gedragen worden,[…] zij hebben het meeste last of profijt ervan." (AT3_G1_18)

Page 33:
"Voor klimaat adaptatie alleen loopt niemand warm, maar misschien wel voor mooie attractieve buiten ruimtes met mooie zit mogelijkheden en speeltuinen en minder rommel op straat." (AT3_G1_20)

Page 33-34:
"Met een subsidie. Ja dat is niet in de wijken waar we het het meest nodig hebben." (AT3_G2_16)

Page 34:
"Ja en misschien als er echt een hittegolf is dat een soort teampje door die wijk heen loopt die echt naar die complexen gaat en dan even ja aanbelt heeft u water op, gaat het goed hier? Het wordt heel heet van de week. Zoiets dat ze actief ouderen benaderen." (AT4_G1_1)

Page 34:
"Het is zoals het is…en het wordt alleen maar erger" (Focus Group Discussion).

Page 35:
"Bijvoorbeeld bepaalde bewonersorganisaties hebben ook straat vertegenwoordigers en dat zijn dan mensen die een straat in de gaten houden en die houden dan contact." (AT1_G1_7)

Page 36:
"Misschien heel simpel advies is, tijdens een zware hittegolf. Kijk ook, klop ook eens eventjes aan bij de buurman. Denk aan je oom die op een flat in Amsterdam woont in zijn eentje. Denk aan de kwetsbaren ook, of maar alleen om even praatje te maken en check hoe het gaat. Dat is gewoon heel simpel advies." (AT6_G2_4)

Page 37:
"We hadden flyers gemaakt met hoeveel glazen drink jij per dag, konden ze ook afturven, dat werkte heel goed." (AT2_G1_12)

Page 37:
"…maar wij doen het in bingovorm en dat helpt heel erg. Met bingovorm doe je het met beeld en geluid, we hebben het in de Schilderswijk heel interactief gedaan." (AT2_G1_12)

Page 43:
"Een groot portfolio te hebben met allemaal ideeën wat je allemaal lokaal kan doen […] Want ik heb het idee dat iedere gemeente opnieuw het wiel wil gaan uitvinden." (AT3_G2_3)

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