Preventing Urban Heat Stress: Exploring the Role of Hospitality Entrepreneurs in Public Health Promotion

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Abstract

Climate change and the urban heat island effect increase the risk of heat stress, with built-up areas such as Rotterdam being particularly vulnerable. Most heat-related health consequences are perceived as preventable through improved preparedness. This study explores how hospitality entrepreneurs perceive their role in supporting public health by offering free tap water during heat, using the Health Belief Model (HBM) as a framework. A qualitative approach with semi-structured interviews was used, consisting of 11 participants across a variety of business types. Thematic analysis was applied to identify recurring patterns in perceptions and practices. Findings show that offering free tap water was primarily guided by hospitality values and guest satisfaction, rather than health considerations. While participants were generally aware of the health risks of heat, this often did not translate into targeted water-serving policies. Benefits such as guest loyalty, better guest experiences, and offering good service were acknowledged, but practical barriers, financial concerns, and the fear of abuse limited implementation. External cues like temperature had limited influence, whereas social and personal factors played a stronger role. Insights from this study can inform more context-sensitive public health strategies that align with the service identity of hospitality professionals.

Key words: Heat, Public health, Water consumption, Hospitality sector, Health Belief Model, Climate resilience.

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As global temperatures continue to rise, climate change has emerged as one of the most pressing societal challenges of the 21st century (World Health Organization [WHO], 2023). A direct consequence of this environmental issue is the increased frequency, duration, and intensity of hot days and heatwaves (Koninklijk Nederlands Meteorologisch Instituut [KNMI], n.d.-a; KNMI, n.d.-b; WHO, 2023). These changes in extreme weather patterns have a serious impact on public health worldwide. Prolonged exposure to high ambient temperatures significantly increases the risk of heat-related morbidity and mortality, with greater risk associated with higher degrees of global warming (Ebi et al., 2021). The effects of climate change have also been increasingly seen and felt in the Netherlands (Rijksinstituut voor Volksgezondheid en Milieu [RIVM], 2024). Temperatures that were deemed impossible according to Dutch meteorologists are now being reached, with an extreme peak at 40.7°C in Gilze-Rijen in 2019 (Betgen et al., 2024). Building on these extremes, climate projections suggest that the Netherlands will be increasingly affected by longer and more intense periods of heat, with an estimated 250 excess deaths annually attributable to extreme heat events (RIVM, 2024).

In addition to mortality, the upsurge in hot days and heatwaves is associated with an increase of emergency room visits and hospital admittance, adverse pregnancy and birth outcomes, increased health-care costs, and heat-stress (Ebi et al., 2021; Kleerekoper, Van Esch & Salcedo, 2012). Heat stress is among the most extensively documented health consequences of heat, which occurs when the body is unable to sufficiently dissipate excess heat (RIVM, n.d.). This condition results from the interaction between environmental conditions (i.e., temperature, humidity, solar radiation), physical work rate (i.e., metabolic heat production), and wearing of clothing that impedes heat loss (Périard, Racinis & Sawka, 2015). When these

factors overwhelm the body's thermoregulatory mechanisms, the risk of heat-related illnesses increases. In extreme cases, prolonged exposure to heat can cause the clinical syndromes of heat stroke, heat exhaustion, heat syncope, and heat cramps (Kovats & Hajats, 2008). Considering the climate predictions for the Netherlands, the largest threat lies in heat stress (Kleerekoper, Van Esch & Salcedo, 2012).

Urban areas are especially vulnerable to the effects of global warming because of the urban heat island effect, which is a common phenomenon in many cities and refers to the temperature difference between urban and surrounding rural areas (Kleerekoper, Van Esch & Salcedo, 2012; Yang et al., 2016). Due to their dense infrastructure, cities absorb and retain heat for prolonged periods, making built-up areas in the Netherlands particularly susceptible to heat-stress (Delta Programme, 2015). Urban environments further contribute to a so-called top-down heat cascade, in which external ambient heat is transferred into buildings and ultimately affects individuals, increasing the risk of heat-related health effects (Jay et al., 2021). As a result, citizens in urban areas are more prone to heat-related illness, hospitalization, and mortality (Jenerette et al., 2011; Klok & Kluck, 2018). Strikingly, it is estimated that by 2050, about two-third of the world's urban population will be affected by deadly urban heatwaves, raising the level of concern from public, institutional stakeholders, governments and the research community (Kotharkar, Ghosh & Arch, 2022).

Importantly, despite the growing health risks, most heat-related health consequences are deemed preventable through improved preparedness (Ebi et al., 2021). This underlines the critical importance of implementing effective heat adaptation strategies that reduce exposure and promote resilience across populations – especially in urban areas, where heat-related risks are often amplified (Jenerette et al., 2011). Therefore, accessible cooling strategies during hot weather and heat extremes are urgently needed (Jay et al., 2021). Effective cooling solutions can be adopted at the individual level and should focus on cooling the person to relieve

physiological heat strain, as opposed to cooling the surrounding environment (Jay et al., 2021). Among these individual-level strategies, sufficient water intake is of particular importance (Aphamis et al., 2019). Proper hydration is essential for effective thermoregulation and plays a critical role in reducing heat-related stress (Betgen et al., 2024; Ebi et al., 2021).

To promote resilience against extreme heat and promote adequate water consumption, both international and national bodies have introduced frameworks for coordinated prevention. In 2008 the World Health Organization (WHO) developed the Heat-Health Action Plans (HHPAs), providing guidance to governments across Europe for effective heat-risk preparedness (Matthies et al., 2008). These plans have since been implemented at national and subnational levels, aiming to reduce the health burden of heat events through timely communication, risk assessment, and public engagement (Martinez et al., 2019). Similarly, in the Netherlands, the National Heat Plan (NHP) is activated by the RIVM during periods of extreme heat. It functions as a communication strategy directed at organizations, healthcare professionals, and volunteers, emphasizing basic yet vital protective actions (RIVM, n.d.; Van Gaalen et al., 2024). The first documented guideline within the NHP emphasizes the importance of staying adequately hydrated through sufficient fluid intake (RIVM, n.d.).

While these structured interventions – such as early warning systems, public risk communication, and guidelines for vulnerable groups – have enhanced awareness and preparedness for extreme heat and the promotion of sufficient hydration, their success relies heavily on effective action on the local and individual level (Matthies et al., 2008; Van Gaalen et al., 2024). For instance, in the Netherlands, access to drinking water has been promoted through establishment of public water tap points across the country, enabling people to refill bottles with clean tap water free of charge (Atlas Leefomgeving, n.d.). However, although these taps are increasingly available, they might not be easily accessible or visible in crowded hospitality areas where people spend much of their time during hot days in urban areas. Cafés,

restaurants, and bars play a central role in public life, especially during summer (Qi, Mazumdar & Vasconcelos, 2024). Therefore, hospitality entrepreneurs could offer a complementary and highly visible contribution to heat-related prevention and public health, particularly by offering free tap water during periods of heat.

Despite this potential, it remains unclear to what extent hospitality entrepreneurs feel responsible or willing to participate in heat-related health promotion efforts. Understanding their risk perceptions, perceived benefits, and perceived barriers towards offering free tap water may help uncover new opportunities for informal public health support in times of heat events. As this topic has not yet been studied, this research takes a pioneering approach by focusing on the voluntary behavior of hospitality entrepreneurs in the context of heat. To better understand what drives such voluntary support behavior, this study draws on the Health Belief Model (HBM; Champion & Skinner, 2008; Rosenstock, 1974). Originally developed to explain health-related behaviors in individuals, the HBM has been widely used to predict and influence a broad range of preventive actions (Prestwich, Kenworthy & Conner, 2024). In this study, the model offers a useful framework for assessing how hospitality entrepreneurs perceive the health risks of heat for their guests and their own role in preventing these risks.

According to the HBM, whether someone engages in health-protective behavior depends on a combination of psychological perceptions and contextual factors. Firstly, perceived susceptibility refers to whether entrepreneurs believe that their guests are personally at risk of heat-related health issues while they are present at their establishment. This is complemented by perceived severity, which concerns how serious they consider the consequences of such heat-related conditions to be for their guests. Thirdly, the perceived benefits of taking action play a crucial role, which in context of this study would be the perception of entrepreneurs that providing free tap water is an effective and meaningful way to reduce health risks. Conversely, perceived barriers may limit action, such as concerns about

costs or logistics. Additionally, cues to action can serve as external triggers that prompt action, such as guest requests, public campaigns, or the behavior of other hospitality entrepreneurs. Lastly, self-efficacy relates to the entrepreneur's confidence in their ability to implement this behavior successfully, meaning that they feel capable to provide free tap water as a standard offering during hot days. By applying this framework, the study seeks to explore the underlying perceptions that shape the willingness and behavior in the hospitality sector.

As mentioned, urban areas are particularly affected by the effects of global warming. Consequently, this study will focus on one such area: Rotterdam. According to heat maps, Rotterdam is strongly affected by the urban heat island effect as well as heat stress (see Figure 1; Atlas Natuurlijk Kapitaal, n.d.). In response to these challenges, the municipality of Rotterdam is increasingly interested in mitigating heat-related risks. The city is involved in the Heat Lab Rotterdam – a collaborative platform that brings together health organizations and knowledge institutions that co-develop and test heat adaptation strategies (Convergence, n.d.). Additionally, the study is situated in the context of preparations for Heat Action Day, a global initiative raising awareness of heat-related risks. The study was initiated by GGD Rotterdam-Rijnmond, an organization involved in the Heat Lab, to gain insight into the perception and current practices of hospitality entrepreneurs and explore the potential of free tap water as a preventive health measure during heat. This underscores Rotterdam's relevance as a case study for exploring local-level health protection strategies during heat.

Figure 1

Urban heat island effect (left) and Heat stress (right) maps of Rotterdam

Note. Adapted from Atlas Natuurlijk Kapitaal, n.d. Retrieved from: https://www.atlasnatuurlijkkapitaal.nl/kaarten

Therefore, this study aims to answer the following research question: “How do hospitality entrepreneurs in Rotterdam perceive their role in supporting public health by offering free tap water during heat?”. Moreover, three sub questions – which are based on the elements of the HBM – are used to gain a deeper understanding of the perception of hospitality entrepreneurs. First, perceived susceptibility and severity is evaluated by answering the question “How do hospitality entrepreneurs perceive the health risks of heat for their guests?”. Second, perceived benefits and barriers will be asked: “What possible benefits and barriers do hospitality entrepreneurs associate with offering free tap water during heat?”. Lastly, to better understand the cues to action the last sub question was formulated: “What would motivate hospitality entrepreneurs to take action in supporting heat prevention?”.

Since there was no prior research on this specific topic, this study takes on an exploratory approach. Rather than testing predefined assumptions and theories, the aim is to gain insights into how hospitality entrepreneurs view their role in public health during heat. These insights could serve as a foundation for future research and policy development.

Methods

Study Design

To answer the research questions, a qualitative method was employed. This approach was considered since there is no prior research exploring how hospitality entrepreneurs perceive their role in public health promotion. Qualitative research is particularly suitable for examining and understanding the perspectives and experiences of individuals and groups (O’Brien et al., 2014), which is why this approach was most fitting. Furthermore, in this study a thematic analysis was used to analyze the interview data, following the six-phase approach outlined by Braun and Clarke (2006). This method allowed for the identification of recurring patterns and themes in participants’ perceptions regarding the provision of free tap water during heat events.

Sample

This study included 11 participants who were selected using purposive sampling. A sampling technique that is typically known as a deliberate method for selecting participants with relevant knowledge or experience on the research topic, ensuring that the data collected is rich and meaningful (Etikan, Musa & Alkassim, 2016). This approach was appropriate for the current study as it allowed for the inclusion of individuals who could provide in-depth insights into the perception of hospitality entrepreneurs to offer (or not offer) free tap water during hot days. Participants were recruited to meet specific inclusion criteria. Firstly, participants had to be the owner, manager, or an individual with decision-making authority within a hospitality establishment, ensuring they have the ability to influence whether or not free tap water is made available for guests. Secondly, only hospitality establishments within the city center of Rotterdam (e.g., Witte de Withstraat, Meent, Oude Binnenweg, Oudehaven) were included, as this area is known for its high concentration of hospitality venues. Thirdly, hospitality establishments had to be open during the day. The fourth inclusion criterion was that the hospitality establishment had to be active during the summer months when heat-related consequences are most relevant. Lastly, the participant had to be willing to participate in an interview and be open to discussing the topic. The only exclusion criterion was businesses that do not provide relevant services; establishments that do not serve beverages or where offering free tap water is irrelevant such as takeaway-only businesses, or establishments without seating areas.

Demographic information such as age and gender were not collected to maintain anonymity. Relevant contextual information, including the type of hospitality establishment, available facilities, and whether the venue was part of a larger chain with a shared water serving policy, were collected to provide context for the study. Additionally, an informal estimation of venue size (i.e., number of tables, staff presence, and indoor/outdoor seating) was made by the

researcher, these estimations were not formally validated and should be interpreted with caution. While location was used to meet inclusion criteria (city center of Rotterdam), it was not further analyzed in the results.

Based on Guest, Bunce, and Johnson (2006), an initial sample size of 12 was anticipated. However, the final sample size was determined based on data saturation, meaning that data collection continued until no new themes or insights emerged from the interviews (Guest, Bunce & Johnson, 2006). Saturation was assessed after each interview by analyzing transcripts through a coding process to identify emerging similarities and differences. This ensured that no new themes or insights were arising, which was reached after 11 interviews.

Data Collection

Prior to recruitment of participants, a preliminary list of hospitality establishments was gathered based on their location, type of establishment, and whether they met all inclusion criteria. The list was curated to reflect variation in establishment type and size, in order to capture a broad range of perspectives. To recruit participants, a combination of field visits and e-mails was used. A short study information sheet was provided (in Dutch) to potential respondents, explaining the research objectives, participation criteria, and contact information of the researcher (see Appendix A). If the hospitality establishment was contacted via e-mail, the information sheet was sent to the participant. E-mails were only sent when an employee present during the field visit referred the researcher to an owner, manager, or another individual with decision-making authority who was not available at the time. During the recruitment phase, several establishments declined participation (n = 17) or did not respond to follow-up contact (n = 2). Reasons for non-response remained unclear, as this was noted but not formally analyzed.

Semi-structured interviews were conducted, for which an interview guide was developed (see Appendix B). The interview guide was structured around key components of the HBM, however the semi-structured design allowed for the exploration of unexpected themes, facilitating both theory-driven and emergent insights (Kallio et al., 2016). Participants were asked about their perceptions of the health risks of heat for their guests (perceived susceptibility and severity), their views on the benefits and barriers of offering free tap water (perceived benefits and barriers), and what might prompt or support them in taking such preventive actions (cues to action). In addition, questions explored their confidence in being able to implement this behavior effectively (self-efficacy).

Interviews were recorded using a smartphone recording application. The recordings were later manually transcribed to facilitate analysis. All interviews were conducted at a time and location convenient for the participant. If the participant was unable to meet in a face-to-face interview, there was also the possibility to do the interview in an online setting using Teams (n = 2). Each interview lasted approximately 20-30 minutes. Interviews were in Dutch (n = 10) or English (n = 1). After the interview, participants were thanked for their time and asked if they would be willing to participate in an initiative during Heat Action Day (June 2, 2025) and possibly be contacted for follow-up questions about their experiences after this action day.

The collected data was transcribed and analyzed anonymously by removing any personally identifiable information. They were then stored on a personal drive, accessible only to the researcher. To ensure confidentiality, each participant was assigned a unique identifier code used throughout the analysis. After data analysis and completion of the study, all audio recordings and transcripts of participants were deleted.

Ethical considerations, including confidentiality and voluntary participation, were strictly maintained throughout the research process. Prior to the interview, participants received an informed consent, which included the voluntary and confidential nature of their participation,

their right to withdraw at any given moment without consequences, and information on data storage. The forms were given in person and participants had the opportunity to ask any questions before agreeing to participate.

The interviews were conducted by the researcher, a master's student in Health Psychology, who has had no prior training in qualitative interviewing but has research experience within the field of psychology. The researcher identifies as female and was not previously acquainted with the participants. To ensure transparency, participants were informed about the purpose of the study and the researcher's academic background and interest in the topic. Reflexivity was maintained throughout the research process by regularly reflecting on potential biases and assumptions, and by discussing emerging interpretations with peers and supervisors.

Data Analysis

Thematic-analysis was performed to analyze the interviews, following the six-phase framework by Braun and Clarke (2006). The methodology includes (1) data familiarization, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. Furthermore, a directed content analysis was employed, which uses a combination of inductive and deductive strategies to analyze data (Van Staa & De Vries, 2014).

Data were systematically coded using ATLAS.ti (version 25.0.1; ATLAS.ti Scientific Software Development, 2024), a qualitative data analysis software. This involved identifying specific sections of the transcripts that were relevant to the research questions. These sections were tagged with short, descriptive codes within the software. A second coder independently reviewed two transcripts and compared the codes with the initial codes. Discrepancies were discussed until consensus was reached. After coding all interviews, similar codes were grouped

together into overarching themes that emerged from the data. Response patterns were deemed a theme if they captured something important about the data in relation to the research question. Once the initial themes were formed, they were reviewed and refined to ensure they accurately represented the data. This phase involved revisiting the data to check whether some themes overlapped, or if some themes needed to be discarded or subdivided into smaller themes. This stage of thematic analysis ensures robustness and coherence.

After reviewing the themes, each theme was clearly defined to align with the research aim of the study (see Appendix C for thematic code tree). These final themes were integrated into the results section of this study, providing a comprehensive account of the insights derived from the thematic analysis.

Rigor

Before conducting the actual interviews, a pilot test of the semi-structured interview guide was carried out to evaluate the clarity, relevance, and comprehensiveness of the questions, and increase internal validity. The pilot interview was conducted with one hospitality entrepreneur who met the inclusion criteria. The aim of the pilot interview was (1) to assess whether the questions were understandable and clearly formulated, (2) if the questions effectively captured the constructs of the HBM, (3) whether the sequence and structure of the questions flowed naturally during the conversation, (4) and to identify any questions that might need rephrasing or removal. Based on feedback from the pilot interview, minor adjustments were made to improve the order of questions and duration of the interview.

Results

Participant Characteristics

All participants in this sample were either owners or managers of food and beverage establishments located in the city center of Rotterdam. The sample included a variety of

business types, such as wine bars, brasseries, tapas bars, and self-service restaurants. Table 1 shows an overview of each participant's role within the company, the type of establishment they represented, whether their business operated multiple locations or was part of a chain, and the extent to which free tap water was made available to guests, especially during hot days. Across interviews, participants generally considered a hot day to be 25ºC or higher. All establishments offered outdoor seating with parasols to maintain shaded seating spaces, especially on hot days. The majority of venues also had air conditioning indoors.

Table 1

Participant Overview

Participant	Role in Company	Type of Establishment	Multiple Locations	Estimated Venue Size	Extent of Water Availability
P1	Manager	Restaurant/Café with evening club events	Yes	Large	Provides water on request; occasionally offers carafes on hot days
P2	Manager	Restaurant/Café with evening club events	Yes	Large	Provides water on request; places carafes indoors on hot days
P3	Floor Manager	Restaurant/Café with evening club events	No	Large	Does not serve free tap water
P4	Floor Manager	Restaurant/Café with evening club events	Yes	Large	Does not serve free tap water
P5	Assistant Manager	Tapas Bar	No	Small	Provides free water proactively on hot days or upon request
P6	Owner	Restaurant & Bar	Yes	Medium	Provides free water proactively
P7	Manager	Self-service Restaurant	No	Small	Does not offer free tap water
P8	Owner	Wine Bar	No	Medium	Provides water on request
P9	Co-owner	Wine Bar	No	Small	Provides free water as a standard practice
P10	Manager	Cocktail Bar	No	Small	Provides free water as a standard practice
P11	Floor Manager	Brasserie	Yes	Large	Provides water on request

Note. "Restaurant/Café with evening club events" refers to venues that operate as a restaurant or café during the day and host club or nightlife events in the evening. "Multiple Locations"

refers to whether the establishment is part of a larger chain or has additional branches with the same policy. “Estimated Venue Size” is based on informal observation and divided into three categories: Small (20–50 seats, 2–3 staff members visibly present), Medium (51–70 seats, 4–6 staff members visibly present), and Large (more than 70 seats, more than 6 staff members visibly present). “Extent of Water Availability” indicates the standard practice regarding the provision of free tap water to guests.

Health Risks of Heat for Guests

Perceived susceptibility. All participants demonstrated awareness of the potential health risks associated with heat, particularly the importance of staying hydrated, indicating a shared sense of perceived susceptibility among the entire sample. A majority specifically noted concern for vulnerable groups, such as elderly people. One participant explained: “And also if we see somebody for example an elderly person […] especially on days when it’s hotter […] we will go and ask ‘hey, would you like a glass of water?’” (P10). Additionally, most participants stated that they give water when guests need to take medication or in cases of extreme (heat-related) health complaints, even if they otherwise did not routinely offer free tap water. This seems to be a consistent pattern across the sample and noticeably all participants mentioned this when asking whether they were aware of the heat-related health risks for guests.

Perceived severity. While participants generally acknowledged that heat could pose health concerns, only a minority actively linked specific guest behavior to heat exposure, reflecting a variation in perceived severity. As one participant stated: “Well I wouldn’t know, because people drink so much [alcohol]. So, I don’t pay attention to that” (P8), illustrating how alcohol consumption can obscure the identification of heat-related symptoms.

Only a few participants had directly observed heat-related complaints, such as guests feeling faint, eyes rolling back, or excessive sweating. For instance, one participant recalled: “I have experienced it once before. Someone who got a bit overwhelmed by the heat. We brought him inside into the air conditioning and offered some hydration” (P4).

Despite the limited direct observations, a majority of participants expressed a sense of responsibility in preventing heat-related discomfort. However, all participants indicated that they provided shaded seating for guests, a measure which they more directly associated with preventing heat-related discomfort than offering free tap water, indicating that participants varied considerably in how they translated concern into proactive policies. Overall, while susceptibility to heat was widely recognized, severity was more ambiguously perceived, as heat-related issues were seen as difficult to isolate or confirm, particularly in settings where alcohol use was more prominent.

Perceived Benefits and Barriers of Offering Water

Perceived benefits. Participants identified various perceived benefits of offering free tap water to guests. While almost none explicitly linked this behavior to health promotion, a majority emphasized its value from a service perspective. Providing water was regarded as a gesture of hospitality that enhanced guest satisfaction – particularly since free tap water is not widely expected in the Dutch hospitality context. As one participant explained: “It is always positive feedback […] so, when you do give it, it makes a difference […] sometimes you even get a ‘Oh I didn’t order that’, like they think we’re going to charge for it and that’s horrible” (P10). Others added that it could indirectly benefit business, as guests who received water could be more likely to stay longer or consume more. For instance, one noted, “They last longer at the table, so ultimately, they drink more – maybe five glasses instead of three” (P9). Several participants also believed such gestures fosters guest loyalty: “If you sit down here and get some water because it’s hot, I think you’re more likely to come back than if you ask and get a ‘no’” (P5).

Beyond these practical advantages, many participants described their motivation as rooted in personal or organizational values. For them, offering tap water was part of a broader hospitality philosophy rather than a strategic decision. As one participant explained: “It’s part

of our service philosophy – it belongs to the experience we want to offer. I believe you gain more by offering good service […] the costs of a glass of tap water is so low, it hardly matters" (P9). Providing tap water was also seen as a way to distinguish themselves from competitors and demonstrate attentiveness to guest comfort. Most participants who did offer free tap water expressed criticism toward businesses that refrain from doing so, portraying them as prioritizing short-term profit over long-term guest satisfaction. One participant stated: "I just think that's ridiculous […] like I said earlier, there seems to be a divide between businesses that focus on profit and those that focus on hospitality. And hospitality is what the industry is all about" (P6).

Overall, the motivation to offer free water was primarily framed in terms of hospitality and enhancing guest experience, rather than concern for guest health during heat. Whereas a few participants mentioned encouraging hydration on hot days, most indicated that they routinely offer tap water regardless of temperature – reinforcing that the gesture is rooted more in service-mindedness than in response to heat-related health concerns.

Perceived barriers. Despite these advantages, participants also expressed financial, practical, and reputational barriers to offering free tap water. Even those who routinely offered water acknowledged challenges in implementation, while a minority of the sample was more hesitant due to structural or economic concerns.

A commonly mentioned concern was potential abuse, particularly from guests who might stay for extended periods without ordering more than water: "The problem isn't that people want water, but there's a whole movement […] that thinks it's fine to sit in a café for hours on one cappuccino and six carafes of free tap water while they study here" (P11). This concern particularly highlights a distinction between daytime-oriented hospitality venues – where guests may come to work or study – and evening-focused establishments, where such use of space is less relevant. Similarly, one participant worried about the impact on their image or the potential for attracting guests who were not their intended target group.

Additionally, approximately half of the sample emphasized the economic consequences of offering free tap water, stressing the costs of water itself: “The mere idea that something is free – I still find that fascinating. Even my water isn’t free […] I pay for it yearly. So, if I start giving out 10 liters of free water a day, I’ll have to service my system more often” (P11). For others, it interfered with existing supplier agreements. One manager noted, “If I drop X from my deal […] that would impact my year-end kickback bonus […] the more you sell, the more money you get back. And we’re talking thousands of euros” (P7).

Practical concerns such as increased staff workload and water waste were cited as key operational barriers. As one participant put it, “It still costs time, personnel – your bartender, you need extra steps, it has to be cleared again, etc., so it just costs time and money” (P1), making a clear distinction between the product water and the service of bringing it to a table. One participant highlighted how the size of the venue, type of establishment, and available resources could influence feasibility: “I personally think that [the practical burden] is minimal. But it depends on the size of the business. I run a small bar, we do everything ourselves… so, if I’m behind the bar, I take the order, I prepare and bring the order. What you see for example at X, is that one person comes to take the order, one prepares it, another is behind the bar. There is one runner, and then yet another one takes it away when guests are finished” (P9). This suggests that smaller establishments in the sample – such as those represented by P5, P6, P8, P9, and P10 – tended to report fewer practical challenges in implementation of provision of free tap water.

Cues to Action

External cues, such as the temperature (25ºC was described as a hot day by participants), served as triggers for most participants to take heat-related actions, such as providing more shaded seating and offering sunscreen to guests. However, only a minority of the sample translated this awareness into the practice of offering free tap water specifically in response to

heat. Moreover, those who do not serve offer free tap water do not perceive a role for themselves in the prevention of heat-related complaints. These participants believed the availability and awareness of public water points – rather than internal hospitality policy – would be a more helpful preventive measure.

Participants who did not offer free tap water as a standard service or as a heat-related measure emphasized that their decision was not influenced by government subsidies (if made available) or external pressures. One participant declared that change should come from within the organization, through mindset shifts or strategic adjustments, rather than external motivators such as fees.

More commonly, social interactions with guests played a central role in prompting action. A majority of participants stated that they provide tap water when specifically requested, but do not offer it by default: “We don’t automatically put a glass of water on the table. We stick to the policy that guests need to ask for it” (P8). In case of wine or coffee, water was often offered proactively: “We do try to offer mineral water, but if someone wants a glass of water, they get one. Often when someone orders a bottle of wine, you automatically bring water as well” (P2).

Notably, a minority of the participants who expressed reservations about offering free tap water still did so in practice, often out of courtesy or in response to specific guest needs. One participant mentioned concerns about negative online reactions, which could influence their clientele: “But it’s also, and this is another category, if I didn’t offer it, I assume that group would go somewhere else. And they’ll go scream about it on Instagram — that you have to pay for a carafe of tap water, so expensive” (P11). This illustrates that attitudes and behavior do not always align.

Self-efficacy

While self-efficacy in the HBM typically refers to the confidence to adopt specific preventive health behaviors (e.g., actively offering free tap water during heat), participants in this study mainly expressed confidence in continuing their existing routines. Despite varied approaches, most participants believed their current practices were sufficient and did not feel a need to adjust their tap water policies based on temperature or health prevention: “Yes, but ‘take care, drink water’ doesn’t mean free water, right?” (P1). This aligns with their broader sense of confidence in their ability to act. Participant who routinely offered water reported no barriers: “We have a tap here, and the carafes are just right there. So, if people want water, that’s all fine” (P5). Even when acknowledging profit concerns or operational workload, those who gave water freely saw it as a deliberate and manageable choice: “I don’t see it as extra effort […] it’s just a conscious choice on my part” (P6).

These responses reflect a generally high sense of self-efficacy, not necessarily in adopting new health-driven behaviors, but in maintaining existing routines and managing water provision according to their own standards and policies.

Discussion

The objective of this study was to gain an insight into how hospitality entrepreneurs in Rotterdam perceive their role in supporting public health by offering free tap water during periods of heat, using the Health Belief Model as a conceptual lens. Although not formally tested, its components helped structure the interpretation of participants’ views and actions. The findings of this study indicate that hospitality entrepreneurs in Rotterdam primarily approach the provision of free tap water during heat from a hospitality and guest satisfaction perspective, rather than explicitly as a public health intervention. While participants are aware of the potential health risks associated with heat, this awareness seldom translates into targeted water-

serving policies. Instead, perceived benefits for offering water tend to center on fostering guest loyalty, enhancing guest experience, and demonstrating good service. Reported barriers mainly involve economic concerns, operational workload, and fear of abuse. These barriers seem to outweigh potential health motivations, reinforcing the idea that public health is not a primary driver of water-serving behavior. External cues, such as the temperature, have limited influence; actions are more prompted by direct guest interaction, personal values regarding hospitality, and societal pressure. Overall, participants expressed varying degrees of responsibility but generally feel confident in their current practices and show little urgency to adjust tap water policies specifically in response to rising temperatures. This self-efficacy seems to rest more on operational routines and service values than on public health outcomes.

Considering all findings, the HBM provided useful insights into how hospitality entrepreneurs weigh perceived health risks against practical and economic concerns, offering a structural framework to analyze perceptions of participants. However, findings show that the HBM is only partially suitable for this context, as it primarily focuses on the prediction of preventive health behavior (e.g., vaccination or screenings; Prestwich, Kenworthy & Conner, 2024; Ritchie, Van den Broucke & Van Hal, 2021). It appears less suited to explaining reactive and socially motivated behavior such as acts of service in the hospitality sector. In addition, its cognitive focus views individuals as rational beings, not accounting for emotional, social, and contextual factors (Ritchie, Van den Broucke & Van Hal, 2021). In line with existing literature, perceived benefits and barriers are the strongest predictors for the behavior of entrepreneurs, whereby the decision to offer free tap water is more commonly driven by service- and image considerations rather than health motives (Carpenter, 2010; Sulat et al., 2018).

At the same time, perceived susceptibility and severity appear to be less predictive, partially since the variation in perceived severity is small among participants without direct experience with heat stress. These variables are often only indirectly relevant via perceived

threat, which could limit their direct predictive behavior (Carpenter, 2010; Sulat et al., 2018). Consequently, these factors hardly influence behavioral intentions in hospitality entrepreneurs. In this study, participants generally acknowledged that heat could pose risks to guests. However, this awareness often did not translate into concrete action (e.g., proactively promoting hydration during periods of heat). While some were attentive to vulnerable groups and heat-complaints, others downplayed the issue or did not attribute behavior to rising temperatures. These seemingly inconsistent or minimized responses may reflect cognitive dissonance (Aronson, 1969): the gap between the known risks of heat and one's own limited action could result in adjusted reasoning to maintain a consistent self-image as good hosts rather than health actors. In doing so, they may downplay severity or shift attribution. This psychological mechanism limits the explanatory power of the HBM, which primarily centers on health-related cognition.

Similarly, cues to action seem to be insufficiently explored in existing literature, with little empirical evidence supporting the predictive value of this HBM variable (Carpenter, 2010). This gap is notable, as understanding what triggers behavior is crucial to informing effective interventions. In this study, external cues such as temperature had limited influence since participants rarely adjusted their water serving behavior solely based on weather conditions. Instead, actions were more often prompted by direct guest requests, personal service values, or reputational concerns. This indicates that social and operational factors outweigh physical triggers, suggesting behavior is more guided by hospitality norms than by health concerns. The COM-B model (Michie, Atkins & West, 2014) provides a useful alternative framework to interpret this dynamic, emphasizing the interaction between capacity, opportunity, and motivation. Most participants expressed their capability to act (e.g., awareness of heat risks), but highlighted how their opportunity was more social in nature (e.g., shaped by interpersonal influences, social cues, and cultural norms) rather than physical (e.g., shaped by the environment). Additionally, motivation was mostly driven by hospitality values and guest

satisfaction, with limited reference to health concerns. These findings resonate with previous research applying the COM-B to improve hospitality venue ventilation as a response to COVID-19, revealing that most reported benefits and barriers were related to social and physical opportunity and motivation (De-Ville, et al., 2025). Thus, water-serving behavior in hospitality settings may be more effectively approached through models that account for the interplay between capability, opportunity, and motivation, instead of relying on health-based triggers alone.

Furthermore, participants in this study emphasized how their willingness to offer free tap water was often tied to how they perceive 'good hosts' should behave, rather than to deliberate health intentions. This makes the Prototype Willingness Model (PWM; Gerrard et al., 2008) a promising framework for understanding and influencing service-oriented behavior in the hospitality context, a sector in which behavior is often spontaneous and strongly shaped by image, guest expectations, and peer-values. The PWM's social reactive path posits that behavior is guided by situational cues and perceived social prototypes. Social prototypes in this context refer to the typical images of people who engage in certain behaviors (e.g., offering free tap water) which entrepreneurs may associate with positively or negatively. Meta-analytic results highlight the influence of social prototypes on reactive and spontaneous behavior, serving as mental shortcuts that can prompt immediate action without deliberate planning (Todd et al., 2016). These findings suggest that the decision to offer free tap water may be better understood and potentially influenced through models that account for social image, hospitality norms, and situational responsiveness, rather than purely health-oriented reasoning.

Finally, findings of this study highlight that behavior of hospitality entrepreneurs is part of the broader social context in which they operate. The perception and willingness of entrepreneurs to offer free tap water during periods of heat were shaped by structural pressures such as workload, financial feasibility, and normative expectations from guests. These

observations align with the Social Determinants of Health (SDH)-model (WHO, 2010), explaining how health choices are not only the result of individual interventions, but partly influenced by social, economic, and environmental factors. Economic factors, such as the costs of free tap water or anticipated guest expectations, put pressure on hospitality entrepreneurs, potentially leading to behavior that does not always benefit the health of their guests. In addition, social norms and policy play a significant role, as both the culture in which the hospitality sector operates and guest expectations, can strongly influence behavioral choices. The SDH-model emphasizes how socio-economic status influences the possibilities of entrepreneurs to foster health. This indicates that financial factors may limit the willingness to offer additional facilities, even when such choices would promote health outcomes. The integration of the SDH-model underlines the importance of viewing health-related behavior not in isolation, but as situated within the social and structural environment in which it occurs.

Strengths and Limitations

It is important to reflect on the strengths and limitations of this study to assess the credibility and scope of its findings. By using a qualitative, explorative design with semi-structured interviews, this research allowed for a rich, context-sensitive understanding of the perception of hospitality entrepreneurs of their role in supporting public health during heat by offering free tap water. This approach enabled participants to give in-depth information on their perspective and allowed to probe into nuances, yielding important insights. Remaining open to additional perspectives – which was ensured by letting participants speak freely before asking new questions or introducing new topics – allowed for a broader interpretation of the findings. Credibility was strengthened through systematic thematic coding, peer coding, and reflexive practices during analysis. Lastly, the study captured a diverse range of hospitality venues, ensuring a variation in perspectives across different types of businesses.

However, the findings of this study should be interpreted as indicative rather than definitive. Given its qualitative and explorative nature, this study does not aim for statistical generalizability. Instead, it was intended to capture a range of perspectives, which may limit transferability to other contexts. Additionally, participants were recruited using purposive sampling, which may have introduced selection bias, as entrepreneurs with a particular interest in the topic may have been more inclined to participate. As the nonresponse was not formally analyzed, it remains unclear whether the establishments that declined to participate hold fundamentally different views on offering water during heat. Moreover, participants were aware of the study's focus in advance and all date relied on self-reported behavior. This may have introduced social desirability bias in their responses as actual behavior was not observed or recorded. As a result, participants could have overstated the extent to which they offer free tap water (during heat). Nonetheless, questions were framed according to current practice (e.g., whether they provide free tap water), in order to minimize bias and encourage honest responses, emphasizing that there were no 'right' or 'wrong' answers. Finally, while efforts were made to ensure a rigorous analytic process, the interpretive nature of qualitative research inherently carries a degree of subjectivity. Despite these limitations, the study provides a valuable first step in understanding how hospitality entrepreneurs perceive their role in public health during heat, which can inform future interventions, campaigns, and research designs.

Implications for Practice

As depicted above, there seems to be a gap between public health framing and hospitality-driven practice. The limited emphasis on health-related benefits, and the dominance of service-minded reasoning in participants' responses, suggests that health communication strategies (e.g., raising awareness about heat risks) may not be sufficient to change water-serving behaviors in this sector. The current external triggers were mostly rooted in hospitality values. Therefore, increasing motivation to contribute to public health by offering free tap water

during periods of heat should take this into account, which could be fostered by using positive reinforcement. From a COM-B perspective, this means that effective strategies should target the motivational, social, and practical realities of hospitality entrepreneurs. Considering that motivation is closely tied to service identity and guest experience, public health messaging should be framed in terms of hospitality excellence or social responsibility, rather than health risks. Also, to address social opportunity, interventions could make it socially rewarding to offer free tap water in response to heat. For instance, by offering public visibility through window stickers or inclusion on public maps of heat-resilient venues. In sum, interventions should aim to tap into the existing identity of 'being a good host' and not try to replace it with a purely health-driven rationale.

Moreover, reinforcing social norms through social prototypes may further promote behavior change. Although studies have demonstrated mixed effects of different alcohol doses on hydration status, it is generally recommended to increase water intake when consuming alcohol during heat exposure to mitigate the potential dehydration risks (Morris, Ravanelli & Chaseling, 2024). Consequently, a more targeted intervention scope on alcohol-serving venues – such as wine and cocktail bars – is timely and is consistent with the finding that these types of establishments are more likely to offer free tap water by default. Aligning with the PWM, targeting this subgroup with tailored interventions that reflect their social prototypes and professional image could enhance uptake and resonance. For instance, public campaigns could use certain wine or cocktail bars as role models that act responsibly in response to heat. These role models could serve as examples that other hospitality entrepreneurs aspire to be like, enhancing perceived similarity (Gibson, 2004).

Lastly, a few participants mentioned the promotion of public water tap points as a possible alternative intervention strategy. This suggestion is in line with the broader observation that the behavior of hospitality entrepreneurs is embedded in structural norms, such as

workload, financial feasibility, and societal expectations. Instead of placing full responsibility on the hospitality sector, policymakers could consider enhancing public infrastructure by increasing the visibility and availability of water points. Actively promoting their locations and use during heat could also be valuable in supporting public health. This approach would reduce pressure on hospitality entrepreneurs while simultaneously improving access to water for the broader public, regardless of commercial interests. Considering the SDH-model, such structural environmental measures could serve as a meaningful addition to health promotion efforts during periods of heat.

Implications for Research

Building on this study's findings, several directions for future research can be identified. First, while this study examined the perceptions of hospitality entrepreneurs, future studies could explore the experiences, expectations, and behaviors of guests. Such research could reveal to what extent guests value the availability of free tap water during periods of heat, and whether they encounter barriers when requesting it. Moreover, it could examine how awareness and motivation for staying hydrated in hot urban environments can be strengthened. Understanding the guest perspective may provide essential insights for designing more effective and context-sensitive interventions.

Secondly, drawing from the findings of this explorative study, future research using quantitative methods (e.g., surveys) could be valuable to test the identified themes on a larger scale. Quantitative methods allow for the identification of patterns and statistical associations. For example, between the type and size of hospitality venues and the likelihood of offering free tap water during heat. Additionally, an observational design could be used to examine whether stated intentions align with actual behavior.

Lastly, a quasi-experimental design could be used to test tailored interventions, such as nudging or targeted communication strategies, by comparing a group of hospitality entrepreneurs who receive the intervention with a similar group who do not. This study design could help explore to what extent certain cues or triggers contribute to the provision of free tap water during periods of heat. Using different study designs could inform evidence-based policy recommendations and targeted support for the sector.

Conclusion

Hospitality entrepreneurs in Rotterdam perceive the provision of free tap water during periods of heat mainly from a service perspective, not as a health measure. While participants generally expressed awareness of health risks, their actions were more strongly influenced by guest expectations, operational routines, and reputation concerns. Although the application of the HBM provided a valuable understanding, it also revealed limitations, as its health-focused orientation may not fully align with the hospitality context. Findings of this study underline the need for interventions that align with hospitality norms and social drivers, rather than focusing solely on health communication. Future research directions could examine the perspective of hospitality guests and employ different study designs. Overall, this study offers insights to inform more context-sensitive public health strategies, aligning with the service identity of hospitality entrepreneurs.

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Appendix A

Study Information Sheet

Appendix B

Interview Guide

Introduction

First of all, I would like to thank you for participating in this study. As I mentioned in the invite, I am conducting research on the role of hospitality entrepreneurs in promoting public health during heat. The interview will take approximately 30 minutes.

Beforehand you received an informed consent form, which explains that all you answers will be treated confidentially and processed anonymously. I want to emphasize that nothing will be traceable back to you or your business and that the recording will be deleted once the research is finished.

Before we start, I would like to remind you that you can stop the interview at any given time. Is everything clear and acceptable to you?

Opening Questions

1. What do you notice in your establishment on hot days?
2. What facilities do you offer guests during heat? (For example, parasols, air conditioning, etc.)

Theme 1: Perceived Susceptibility & Severity

Purpose: To understand how hospitality entrepreneurs assess the risks of heat for their guests.

1. To what extent are you concerned about the health of your guests during hot days?

Follow-up question:

1. Can you recall any situations in which someone felt unwell due to the heat in or around your establishment?

   a. If so, can you explain and describe how you notice such symptoms?

Theme 2: Perceived Benefits & Barriers

Purpose: To gain insight into how entrepreneurs weigh the pros and cons of offering free tap water.

1. Do you currently offer free tap water to guests (especially during heat)?
   a. Why? / Why not?

Follow-up questions if the answer is no:

1. What do you think about the idea of offering free tap water on hot days?
2. What could be the benefits – for guests, yourself, or your business?
3. What might make it difficult?

Follow-up questions if the answer is yes:

1. How do guests respond to this?
2. To what extent do you experience challenges in offering free tap water?

Theme 3: Cues to Action

Purpose: To explore what might encourage hospitality entrepreneurs to take action.

1. What would motivate you to take action on hot days, such as offering water? (if participant is unsure what you mean: 'Think about guest expectations, government policy, peer examples, support from the municipality, promotional materials, subsidies, etc.')

Theme 4: Self-efficacy

Purpose: To understand how confident entrepreneurs feel in their ability to take action.

1. How feasible do you think it would be for you to offer free tap water as a standard practice on hot days?
    a. What would you need to make that easier?
2. To what extent do you feel responsible as an entrepreneur to protect your guests from heat?

Ending

1. Is there anything you would like to add on this topic that has not been discussed yet?
2. Would you be open to offering a free glass of tap water on the 2nd of June (during Heat Action Day)? / Would you be open to promoting hydration in your establishment on the 2nd of June (during Heat Action Day)?

Appendix C

Code Tree

Table 2

Code Tree

Theme	Subtheme	Codes
Perceived risk of heat *Susceptibility & severity*	1.1 Awareness of heat-related risks	- Perceives heat as a health risk - Recognizes vulnerable groups
	1.2 Observed or expected consequences	- Observed heat-related complaints - Does not link behavior to heat-related complaints
	1.3 Perceived urgency	- Tries to prevent heat-related complaints - Sees heat as incidental/unproblematic
Perceived benefits & barriers	2.1 Benefits of offering free tap water	- Increases guest satisfaction - Guests order more/stay longer - Guests are more likely to return
	2.2 Practical and financial barriers	- Giving water costs money - Fear of abuse/nuisance - Has an effect on profit
	2.3 Feasibility in daily operations	- Operational side of offering free tap water
Cues to action	3.1 External triggers	- Public campaigns/actions from government/municipalities - Temperature as a guideline for action
	3.2 Social and customer influence	- Guest asks for water - Other businesses do it as well
	3.3 Personal motivation	- Wants to be a good host

Self-efficacy & responsibility	4.1 Sense of responsibility	- Feels responsible for the well-being of guests - Considers current service sufficient
	4.2 Confidence in ability to act	- Feels capable to give free tap water - Sees insecurities in implementation
Alternative heat measures	5.2 Facilities	- Offers other facilities to reduce heat-related complaints (such as parasols) - Thinks about alternatives to reduce heat-related complaints (such as misters)
	5.3 Other suggestions	- Thinks about other possibilities aside from hospitality