BMJ Open

Are people interested in receiving advice from their general practitioner on how to protect their health during heatwaves? A survey of the German population

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To cite: Kastaun S, Herrmann A, Müller BS, *et al*. Are people interested in receiving advice from their general practitioner on how to protect their health during heatwaves? A survey of the German population. *BMJ Open* 2023;**13**:e076236. doi:10.1136/bmjopen-2023-076236

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2023-076236).

Received 31 May 2023
Accepted 01 September 2023

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ABSTRACT

Objective Climate change increases the frequency, intensity and length of heatwaves, which puts a particular strain on the health of vulnerable population groups. General practitioners (GPs) could reach these people and provide advice on protective health behaviour against heat. Data is lacking on whether and what topic of GP advice people are interested in, and whether specific person characteristics are associated with such interests.

Design Cross-sectional, nationwide, face-to-face household survey, conducted during winter 2022/2023.

Setting Germany.

Participants Population-based sample of 4212 respondents (aged 14–96 years), selected by using multistratified random sampling (50%) combined with multiquota sampling (50%).

Main outcome measure Interest in receiving GP advice on health protection during heatwaves (yes/no), and the topic people find most important (advice on drinking behaviour, nutrition, cooling, cooling rooms, physical activity or medication management). Associations between predefined person characteristics and the likelihood of interest were estimated using adjusted logistic regressions.

Results A total of 4020 respondents had GP contact and provided data on the outcome measure. Of these, 23% (95% CI=22% to 25%) expressed interest in GP advice. The likelihood of expressing interest was positively associated with being female, older age (particularly those aged 75+ years: 38% were interested), having a lower level of educational attainment, having a migration background, living in a more urban area, and living in a single-person household. It was negatively associated with increasing income. Advice on medication management received highest interest (25%).

Conclusions During winter season 2022/2023, around one quarter of the German population with GP contact—and around 40% of those aged 75+ years—was estimated to have a stated interest in receiving GP advice on protective health behaviour during heatwaves, especially on medication management. Climate change is creating new demands for healthcare provision in general practice.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ A major strength is the use of a sample of the German population, selected by using multistratified random probability sampling (50%) combined with multiquota sampling (50%).
⇒ As the outcome measure was introduced into an existing omnibus survey, however, we did not have flexibility to collect other variables of interest, such as health status and medication use.
⇒ Data were collected during the winter season where health effects of heatwaves might be less apparent to individuals compared with the summer season.
⇒ No data were collected on risk awareness regarding heatwaves and its adverse effects, which may be a prerequisite for the interest in general practitioner advice on preventive measures against heat.

This study provides initial relevant information for research and practice aiming to address these demands.

INTRODUCTION

The WHO[1] considers climate change to be the single greatest health threat to humankind. In the future, our society and healthcare systems will be increasingly confronted with adverse health effects of climate change, such as increased mortality and morbidity during heatwaves,[1 2] resulting in negative impacts on public health.

Heatwaves are hazards that negatively impact various sectors of society such as agriculture, forests, infrastructure and human health.[3 4] Although no universally accepted definition exists,[5] heatwaves are understood to be prolonged or repeated periods with high or higher-than-normal air temperatures during days and/or nights that exceed a predetermined temperature threshold over a certain period of time.[3 4] Such prolonged heatwaves

can cause high thermal stress to the body affecting, for example, the cardiovascular system by increasing blood viscosity and impacting the body's capacity to maintain a constant temperature.[6 7] Numerous studies around the world suggest a systematic association between the occurrence of heatwaves and exacerbated cardiovascular, respiratory and other forms of morbidity and mortality.[8]

In Germany, climate change has been causing more frequent, more intense and prolonged periods of heat in the summer, which has been found to be associated with increased mortality rates.[9 10] In July 2015, for example, a 1.2-fold increase in hospital admissions and over three times higher heat-related morbidity rates were observed for the metropolitan city of Frankfurt am Main.[11] Around 4500 heat-related excess deaths occurred in the summer of 2022, which is described as the fourth warmest summer since weather records began in Germany in 1881.[12] Like other countries, Germany implemented a National Adaptation Strategy on Climate Change to address the effects of extreme weather in order to safeguard people's health from the heat.[13] In addition, in 2017, the WHO recommendations for heat health action plans (HHAPs) were adopted by a working group of the national and federal states of Germany to motivate local implementation of action plans.[14] However, as implementation of HHAPs is not an obligation by law yet and responsibilities on community and federal state level remain unclear, only few communities have HHAP in place,[15] mainly in larger cities, such as Cologne and Mannheim.[16 17] In those cities Institute of General Medicine and Associations of Statutory Health Insurance Physicians (Kassenärztliche Vereinigung, KV) are involved to ensure engagement of general practitioners (GPs) and other physicians.[16] In June 2023, a new national heat protection plan was published by the Federal Ministry of Health. The new concept includes various measures in cooperation with the public health service, general practitioners, hospitals and the healthcare sector together with municipalities and federal states. GPs are to play a central role, especially in protecting vulnerable patients. The focus is on creating awareness that heat can pose a threat to health and on approaches to reach out to patients at risk.[18]

Specific groups of society are particularly vulnerable to adverse health effects of heat such as elderly people, people with disabilities or with underlying medical conditions (eg, people with cardiovascular, respiratory, renal or mental illness or people suffering from multiple diseases), those working outdoors or in non-cooled environments, those living alone (in isolation) or in urban areas with high population density, as well as people with lower socioeconomic status.[2 8 19–23] These risks will increase further due to the wider trends in Europe of an ageing population, with greater levels of chronic disease and increasing levels of urbanisation.[2]

Behavioural measures can effectively help to prevent adverse effects during a heatwave, for instance increasing fluid intake, staying in a cool or air-conditioned environment, wearing loose-fitting clothes, taking showers/footbaths, reducing activity levels, avoiding moderate to high consumption of alcohol and—in people using medication—monitoring and, if needed, adjusting medication intake.[22 24] However, while a recent survey in Germany showed that elderly people aim to tackle heat with a number of body-related, home-protective and activity-related coping strategies, an underuse of water-related heat adaption strategies was observed.[21]

Substantial public health actions will be needed worldwide to tackle health impacts of climate-change induced heatwaves. According to WHO, HHAPs should be designed and implemented together with stakeholders at all levels in the health-sector, including GPs, to prevent direct effects of heat.[25] The WHO's HHAP of 2011 includes specific recommendations on how GPs should proactively identify, advise and monitor patients at risk, and how to educate, counsel and inform patients in general regarding individual adjustments of behaviour, medication and fluid intake, as well as inform them about helplines and medical services.[26] GPs thus have an important role in educating patients on, and assisting them with, health effects of heat.

In general, GPs are well placed to provide such behavioural advice and information as the majority of the population regularly sees a GP, and GPs can particularly reach the most vulnerable groups of society (eg, elderly, multimorbid and socially isolated people).[27] Furthermore, patients report that they see their GPs as a trusted source of information and advice on health behaviour.[28]

However, a survey among GPs in Germany conducted in the year 2022[29] showed that although around 60% of GPs reported observing heat-induced health effects in their patients, only a minority of GPs actively address this topic regularly with their patients. Around 16% reported that they regularly adjust the medication of their patients during heat periods, while around 10% regularly advise their patients on dealing with heat. Only a few GPs proactively contact patients which are at risk during heat periods.[29] Around 40% of GPs report a need for continuing and further training for themselves and for team members on topics and consulting opportunities regarding climate-change related health effects. These recent results are in line with data from a previous qualitative study conducted in 2013 suggesting that GPs' knowledge and awareness of heat health impacts and climate change needs to be strengthened—preferably through target-group-specific training—in order to engage them more extensively into preventive actions with their patients.[30]

To inform the development of effective and tailored prevention measures, it is not only important to explore the interests and perceptions of GPs, but also of those who will be affected by such preventive measures—the patients. Are they interested in receiving GP advice on how to protect their health from heat?

RESEARCH AIM AND QUESTIONS

Using data from a nationally representative sample of the German population, this study aims to assess the following research questions:

1. What proportion of the German population with GP contact expresses an interest in receiving GP advice on health protection during heatwaves, stratified by socio-demographic characteristics, socioeconomic status and region of residence?
2. Are these person characteristics statistically associated with the likelihood of expressing an interest in receiving GP advice on health protection during heatwaves?
3. Among those expressing an interest in such advice, which topic of advice is preferred most, stratified by age and sex of respondents?

MATERIALS AND METHODS

Study design and population

Data was collected using an ongoing, cross-sectional, representative household survey of the German population to which a single question on the interest in receiving GP advice on health protection during heatwaves was added for the period of two survey waves between October/November 2022 and January/February 2023. This study collects data every other month by computer-assisted face-to-face household interviews of participants aged 14+ years (with no upper age limit) living in private households (rented or owned) across Germany. Respondents are selected by using a dual frame design: multistage, multistratified random probability sampling (50% of the sample) combined with multiquota sampling (50% of the sample). Details on the sampling design have been described elsewhere (https://osf.io/s2wxc).

Dependent variable

The question on 'interest in receiving GP advice on health protection during heatwaves' was introduced using a brief explanation: 'Now we would like to ask you a question on a completely different topic. Climate change is causing the earth to warm up. As a result, so-called heatwaves can increasingly be observed in summer, that is, an unusual number of days with high temperatures. These heatwaves can have a negative impact on health. General practitioners could offer advice on how to protect health during heatwaves'.

This introduction text was followed by the question below. Response options (including topics the GP advice should focus on—if so) were presented to respondents as a nominal scale and in a randomised order to minimise the risk for order bias. Respondents were allowed to choose a single answer that best applied to them.

'Would you like to receive advice from your general practitioner on how to better protect your health during heatwaves? If so, which of the following topics would be most important to you?'

1. Yes, I would like to receive advice, especially on my drinking behaviour (eg, what, how much or how often I should drink).
2. Yes, I would like to receive advice, especially on my diet (eg, what or how much I should eat).
3. Yes, I would like to receive advice, especially on how to cool myself down (eg, arm and foot baths, proper use of fans).
4. Yes, I would like to receive advice, especially on how to keep my living spaces as cool as possible (eg, darkening rooms, proper ventilation).
5. Yes, I would like to receive advice, especially on my physical activity (eg, how much, when or where I should exercise).
6. Yes, I would like to receive advice, especially on what to look for regarding medication (eg, storage, adjusting medication intake or changing medication).
7. No, I do not want any advice from my general practitioner on this.
8. I do not see a general practitioner.
9. No answer.

The question was developed together with two experts, who are medical doctors (one of them being a GP) and researchers in the area of climate change and health (AH and BSM).

Independent variables

The following socio-demographic characteristics were measured: age in five categories of 14–24, 25–39, 40–59, 60–74, 75+ years; sex (female vs male); region of residence (metropolitan area, urban area, vs rural area as reference), migration background (yes vs no) and cohabitation as a potential indicator for social isolation (living in a single-person vs other household).

Since effects of climate change, particularly temperature effects,[31 32] as well as accessibility and usage of GPs,[33] are reported to differ between more rural and more urban areas, we assume interest in GP advice on health protection during heatwaves to also differ between residents of different regions. Area of residence of respondents was therefore assessed by using the variable administrative municipality district size ('politische Gemeindegrößenklasse'). This variable consists of seven categories which were summarised into three categories for further analyses comparable to other previous studies in the German population[34] (more details have been published elsewhere: https://osf.io/zp7c6): rural area (<20 000 residents), urban area (20 000–500 000 residents) and metropolitan area (>500 000 residents).

Migration background was defined as a positive answer to the question 'Was one of your parents born abroad?' The official definition of 'migration background' used for administrative purposes includes that at least one parent did not have German nationality by birth. In our study, no information is available for the respondents' country of origin or whether or not they were born in Germany. However, for the purpose of this study we assume that at least part of participants who were classified

Table 1 Characteristics of all respondents (n=4020), and prevalence estimates on the interest in GP advice on health protection (=yes) relative to the respondents' characteristics; including results of regression models on associations between these characteristics and an interest in receiving GP advice (yes vs no)

	Total sample, n=4020 unweighted data % (n)	Interested in GP advice on health protection against heat=yes (vs no)	
		Weighted data, n=892 % (n, 95% CI)	Unweighted data OR* (95% CI)
Sex†			
Male (reference)	47.2 (1899)	19.9 (368, 18.1 to 21.8)	1
Female	52.8 (2121)	26.6 (524, 24.7 to 28.6)	**1.39 (1.21 to 1.60)**
Age in years†			
14–24	8.4 (337)	14.1 (64, 11.1 to 17.7)	*Continuous, per year* **1.01 (1.01 to 1.01)**
25–39	21.9 (881)	22.0 (183, 19.20 to 24.9)	
40–59	32.3 (1300)	20.1 (257, 17.9 to 22.4)	
60–74	25.7 (1033)	28.0 (243, 25.0 to 31.1)	
75+	11.7 (469)	38.2 (146, 33.3 to 43.2)	
Educational attainment‡			
High (reference)	30.8 (1237)	19.4 (231, 17.2 to 21.8)	1
Medium	37.5 (1506)	22.8 (326, 20.7 to 25.1)	1.07 (0.89 to 1.28)
Low	29.5 (1185)	30.0 (314, 27.2 to 32.9)	**1.26 (1.04 to 1.51)**
Household income/€§			
High	26.3 (1056)	21.3 (213, 18.8 to 23.9)	*Continuous, see*¶ **0.91 (0.83 to 0.99)**
Medium	60.8 (2446)	23.6 (556, 21.9 to 25.4)	
Low	12.8 (513)	27.1 (124, 23.1 to 31.4)	
Migration background†			
No (reference)	82.0 (3298)	22.1 (663, 20.7 to 23.7)	1
Yes	14.2 (570)	25.9 (179, 22.7 to 29.3)	**1.62 (1.34 to 2.00)**
Region of residence**			
Rural area (reference)	38.2 (1535)	17.7 (279, 15.9 to 19.7)	1
Urban area	41.9 (1686)	28.4 (464, 26.2 to 30.7)	**2.17 (1.82 to 2.59)**
Metropolitan area	19.9 (799)	24.7 (150, 21.3 to 28.3)	**2.07 (1.67 to 2.57)**
Cohabitation††			
Other household (reference)	62.0 (2494)	21.6 (631, 20.1 to 23.1)	1
Single-person household	38.0 (1526)	29.4 (262, 26.4 to 23.5)	**1.20 (1.02 to 1.40)**

Data are presented as column percentages (number), row percentages (number, 95% CI), and as OR together with 95% CI around OR, statically significant results are highlighted in bold.
*Adjustment sets for regression analyses were derived by application of directed acyclic graphs (more details—including the graphs—have been published together with the analysis protocol https://osf.io/ycz7n).
†Univariate logistic regression model: no adjustment is necessary or possible—as it would produce a collider bias—to estimate the total effect of the independent variable on the outcome.
‡Multivariable logistic regression model adjusted for the variable: migration background.
§Multivariable logistic regression model adjusted for the variables: sex, age, educational attainment, migration background.
¶Entered as a continuous variable in regression analyses (range from 0 (€0 income) to 7 (€7000 or more).
**Multivariable logistic regression model for the variables: age, educational attainment, income per person, migration background, cohabitation.
††Multivariable logistic regression model for the variables: age, educational attainment, income per person, migration background, region of residence.
GP, general practitioner.

as having a migration background according to the definition applied in this study have personal experiences with extreme temperatures (eg, heat, cold, drought) compared with people without such background.[35 36] Previous studies have found higher heat vulnerability and exposure among people with migration background compared with those without.[37–39] We therefore assume that people with migration background may differ from those without such background regarding their interests in terms of health protection against heat, and thus included migration background as a dependent variable in the analyses.

Measured socioeconomic status variables were: educational attainment (low (9 years of education, or no

graduation), medium (10–11 years), high (≥12 years)) and monthly net household income calculated per person in the household. For descriptive purposes, income was categorised using cut-offs that lead to an approximate distribution of: low (~25% of the sample), medium (~60% of the sample) and high (~15% of the sample), approximately reflecting the income distribution in Germany (details on the income calculation can be found here: https://osf.io/387fg/). Income was entered as a continuous variable coded from 0 (€0 income/month) to 7 (≥€7000/month) in the regression models.

Statistical analyses

The study protocol and analysis plan were written prior to analysing the data and preregistered on the Open Science Framework: https://osf.io/ycz7n. Analyses were performed with IBM SPSS Statistics for Windows, V.29.0 (Armonk, New York, USA: IBM Corp).

To address **research question 1**, we report descriptive prevalence data on the number of people expressing an interest in receiving GP advice on how to protect their health against heat effects, stratified by above mentioned person characteristics and reported as percentages together with 95% CIs. For the stratified presentation of results and for logistic regression analyses (research question 2), respondents' answer on the outcome measure was categorised into a binary outcome variable 'Yes, I am interested in receiving advice by a GP on how to protect my health during heatwaves' (answers 1–6, coding: 1) versus 'No, I am not interested in any advice from my GP on this' (answer 7, coding: 0).

Prevalence data were weighted to be representative of the population in Germany accounting for personal and household characteristics. Details on the weighting technique have been published in the main study protocol[40] and elsewhere (https://osf.io/s2wxc).

To address **research question 2**, adjusted logistic regression models were used to explore associations between the predefined person characteristics of respondents and the likelihood that they are interested in receiving advice from their GP on health protection during heatwaves (yes vs no). Adjustment sets for regression analyses were derived by application of directed acyclic graphs. More details—including the graphs—have been published together with the analysis protocol: https://osf.io/ycz7n. Depending on the minimal sufficient adjustment set needed for each model, simple or multivariable regression models were applied. Regression analyses were conducted using unweighted data.

To address **research question 3** among the subgroup of respondents with an interest in receiving GP advice, we present descriptive prevalence data (together with 95% CI) on the topics this advice is preferred to focus on (answer options 1–6). This prevalence data is presented descriptively and stratified by age categories and sex of respondents. We had not planned statistical testing of relative differences in the analysis protocol, as the number of cases in the subgroups was expected to be too small. This descriptive analysis was conducted using unweighted data as weights were only available for the total sample and these should not be applied to subsamples that are already selected on the basis of specific person characteristics (eg, interest in GP advice).

Dealing with missing data

Overall, missing data in this face-to-face survey occurred only for a small share of the following independent variables: education: 2.3%, income: 0.1%, migration background: 3.9%. Thus, we assumed that excluding cases with missing data would not have relevant effects on our results, and used complete cases for the final analysis.

Patient and public involvement statement

The study was population-based and did not address a specific patient group. Public was not involved in design, conduct or dissemination of this study.

RESULTS

A total of 4212 respondents aged 14+ years of the general population in Germany participated in the study between October/November 2022 and January/February 2023. Respondents without GP contact (answer 8, n=128, 3% of the total sample) were on average 8 years younger, more often men, and were more often from the lowest income group compared with those with GP contact. Those without GP contact or who preferred not to answer the outcome measure (answer 9, n=64, 1.5% of the total sample) were excluded from the analyses, which leads to a final sample of 4020 individuals. Person characteristics of this final sample are reported in table 1. The age range was 14–96 years (n=469 aged 75+ years), with a mean age of 51.6 years (SD=18.5) and 52.8% (n=2121) of the respondents were women.

Research question 1: proportion of the sample with interest in receiving GP advice on health protection during heatwaves, stratified by person characteristics

Among the general population, 23.4% (95% CI=22.0% to 24.8%, n=892; unweighted data: 26.8%, n=1079) expressed an interest in receiving GP advice on health protection during heatwaves. Relative differences in this interest stratified by person characteristics are presented in table 1. Highest interest was observed in respondents aged 75+ years (38.2%, 95% CI=33.3% to 43.2%).

Research question 2: associations between person characteristics and the likelihood of expressing an interest in GP advice

The likelihood of expressing an interest in GP advice was positively associated with being female, increasing age, having a low compared with high educational attainment, having a migration background compared with not having such background, living in an urban or metropolitan area compared with a rural area and living in a single-household compared with other households, see table 1.

Table 2 Most important topic the GP advice is preferred to focus on among respondents with an interest in GP advice (n=1079; single answer only, response options were presented in a randomised order)

Yes, I would like to receive advice, most importantly…	% (n), unweighted data
…on my drinking behaviour (eg, what, how much or how often I should drink)	18.6 (201)
…on my diet (eg, what or how much I should eat)	19.9 (215)
…on how to cool myself (eg, arm and foot baths, proper use of fans)	10.9 (118)
…on how to keep my living spaces as cool as possible (eg, darkening rooms, proper ventilation)	10.3 (111)
…on my physical activity (eg, how much, when or where I should exercise)	15.1 (163)
…on what to look for regarding medication (eg, storage, adjusting the amount or changing medication)	25.1 (271)

Data are presented as percentages (number).
GP, general practitioners.

The likelihood was negatively associated with increasing net household income per person.

Research question 3: among those interested in GP advice, which topic of advice is preferred most, also stratified by sex and age?

Table 2 presents the frequency of each suggested topic the advice should focus on according to respondents with general interest in receiving such GP advice. With around 25%, the most frequently mentioned topic referred to medication intake and handling during heatwaves. The least mentioned topics (~10%) referred to strategies of cooling oneself and cooling the living spaces.

Table 3 presents these results stratified by two relevant person characteristics which could be recognised by the treating GP without much effort—age and sex. Among respondents with an interest in receiving GP advice, women (20.7%) compared with men (15.7%) expressed relatively more often an interest in receiving advice on their drinking behaviour, while men (17.5%) expressed relatively more often than women (13.4%) interest in advice on their physical activity during heatwaves.

With regard to age, the youngest age group (14–24 years, 32.2%) was relatively more often interested in receiving GP advice on their drinking behaviour as a health protection strategy against heat, while more elderly respondents aged 60 years and over were relatively more often interested in receiving advice on medication handling and intake (~34%).

DISCUSSION

Among a representative sample of the general population in Germany, aged 14–96 years and with GP contact, which was surveyed during winter season 2022/2023, the proportion of people who expressed an interest in receiving advice from their GP on how to protect their health during heatwaves was 23%. Interest in receiving such advice was higher in specific subgroups such as women, elderly people, people with lower education level and lower incomes, people from urban or metropolitan areas and those living alone, as well as people with a migration background. Respondents were particularly interested to receive advice on medication management during heatwaves, while they were less interested in advice on cooling strategies.

Regarding these preferred topics, relative differences could be observed with regard to sex and age categories of respondents. Women and adolescents to young adults were relatively more often interested in advice on their drinking behaviour, while men were relatively more often interested in advice on their physical activity. Older respondents (>60 years) were relatively more often interested in advice on medication management. This is probably also due to the greater prevalence of drug

Table 3 Most important topic the GP advice is preferred to focus on among respondents with an interest in GP advice, stratified by sex and age (n=1079; single answer only, response options were presented in a randomised order)

Yes, would like to receive advice, most importantly…	Sex, % (n), unweighted data		Age categories, % (n), unweighted data				
	Female	Male	14–24	25–39	40–59	60–74	75+
… on my drinking behaviour	20.7 (131)	15.7 (70)	32.2 (21)	22.6 (53)	14.6 (45)	17.4 (53)	17.6 (29)
… on my diet	19.9 (126)	20.0 (89)	10.8 (7)	22.6 (53)	25.2 (78)	16.4 (50)	16.4 (27)
… on how to cool myself	11.2 (71)	10.6 (47)	15.4 (10)	12.3 (29)	15.9 (49)	4.3 (13)	10.3 (17)
… on how to keep my living spaces as cool as possible	9.9 (63)	10.8 (48)	16.9 (11)	11.5 (27)	8.7 (27)	11.1 (34)	7.3 (12)
… on my physical activity	13.4 (85)	17.5 (78)	9.2 (6)	14.0 (33)	15.9 (49)	16.7 (51)	14.5 (24)
… on what to look for regarding medication	24.9 (158)	25.4 (113)	15.4 (10)	17.0 (40)	19.7 (61)	34.1 (104)	33.9 (56)

Data are presented as percentages (number).
GP, general practitioners.

intake in the elderly. In a survey conducted among physicians in Germany it was found that 40% of the physicians adapted their patients' medication at least occasionally during heatwaves, and 41% gave at least occasional advice on dealing with heat.[29] Thus, there seems to be substantial potential in implementing presummer medication check-ups and giving behavioural advice before and during heatwaves.[25 26] Findings of this study on priorities on which GP advice is wished to focus on could guide future studies exploring these preferences in more detail.

Interest in receiving advice can only develop if awareness about adverse effects of heatwaves is present. A lack of interest can therefore be the result of lack of awareness about adverse effects and their potential mitigation measures, or can result from already acquired knowledge from other sources. In this study advice on how to cool oneself was not identified as a predominant interest. Nevertheless, cooling oneself actively with water-related measures, such as wet clothes or cool arm and foot baths, has been shown to be an efficient and at the same time underused protective measure for elderly.[21 41] This example illustrates that preferences assessed in this study should not be the only guidance for GPs, but need to be considered together with other evidence.

Studies show that public awareness of climate change is related to personal experiences of climate impacts.[42] Interest in GP advice on health protection measures during heatwaves is therefore assumed to also be related to the presence and perception of heat, which is obviously highest during summer months. Data of the present study was collected during the winter season when the effects of heatwaves are less apparent to individuals, so that a considerable seasonality of responses can be assumed. However, we have chosen a time when the population is not particularly aware of heat effects, but rather measure the general interest in GP advice; whereas in summer or during heatwaves, greater interest can be expected. Our results show that on average about one in four people with GP contact express interest in receiving GP advice on health protection measures during heatwaves. The data thus also point out a substantial opportunity of raising awareness among the population on heat-induced health effects. In this context, it is known that individuals often underestimate their own level of risk which poses a barrier to taking action (eg, seeking advice).[43 44] GPs can thus play an important role to strengthen individual awareness among their patients.

To our knowledge, this is the first study to provide evidence that there is an interest in the general public to receive heat health information from their GP. We would have liked to compare our results with other national and international data, but results of other studies on population interest in GP advice on other health behaviour, such as physical activity or diet, are not readily comparable due to different contexts and often different survey methodologies. In general, however, it can be stated that the information needs and system of the GP as a reliable partner can be considered comparable worldwide. Our study provides practical orientation for GPs on what topic of advice people are interested in, and whether specific person characteristics are associated with such interests. It is known that specific groups of society are particularly vulnerable to adverse health effects of prolonged or repeated periods of heat such as elderly people, people with chronic conditions or lower socioeconomic status, those living alone or in areas with high population density[2 8 19–23] and people with migration background.[37–39] This fits well to our results, in which these groups are expressing a higher interest in GP advice on health protective behaviours.

GPs are already, and will increasingly be, on the frontline dealing with health impacts of climate change. It is therefore necessary to develop, evaluate and implement targeted interventions aiming to prepare general practice for these new challenges in order to maintain population health in the best possible way. The present study provides initial data on the current interest of the population for advice from GPs on protective measures against heat and on the specific target groups for such advice. For the future, it will be important to explore climate change-related healthcare needs, risk perception and target groups more in-depth, also with a focus on other impacts of climate change such as health effects from air pollution, allergies, extreme weather events and food and water insecurity. Furthermore, it will be essential to explore GPs' current views, knowledge and practice, as well as potential barriers and facilitators in this regard.

Strengths and limitations

A major strength of this study is the representative sample including respondents of older age groups, and the broad range of relevant person characteristics that were collected among the general population of Germany. Our study also has limitations. As described above, data was collected during the winter season which means that awareness of the topic may differ from those that might have been expressed if data was collected during the summer months. Both might have influenced the response behaviour, and we could not take this into account in the present study. In addition, some respondents who had negative experiences with the counselling behaviour or competence of their GP in the past, may be more likely to refuse any advice on health behaviour in general.

Another limitation is that no information was available on health status and associated needs, or on the use of medication among respondents. The latter becomes relevant particularly with regard to GP advice on medication management during heat. In addition, no detailed information about the migration background of respondents was available. Therefore no differences according to place of birth and region of origin could be taken into account in the analyses, which would have been relevant with regard to potential previous experiences with extreme temperatures.

Furthermore, the six different topics GP advice could focus on were selected by the study team. Respondents could have other interests that were not suggested and thus not taken into account in the present analysis. One has also to consider that the survey design only allowed participants to pick their most preferred advice topic, so that we might have missed secondary preferences. Finally, social desirability bias may have occurred in face-to-face interviews that may have affected the prevalence estimates, most likely resulting in an overestimate.

Our study was conducted in people with GP contact. There is also a small proportion of people who do not see a GP and whose risk during a heatwave may be lower or higher than the surveyed population, but these have not been included here.

Conclusion

Our findings show that in winter 2022/2023, an estimated one quarter of the population in Germany with GP contact was interested in receiving advice on protective health behaviour during heatwaves from their GP; especially on medication management. Specific groups of the population—particularly highest age groups—were even more interested in receiving such advice. This suggests an important opportunity for a group that is particularly vulnerable to adverse health effects of heatwaves.

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Acknowledgements The authors thank Constanze Cholmakow-Bodechtel and Franziska Wenng from the market research institute 'Cerner Enviza' for the collection of the data.

Contributors SKa coordinated the study, conceptualised and drafted the analysis protocol, drafted the manuscript, analysed and interpreted the data. As the guarantor, SKa accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish. AH and BSM provided expert advice on the development of the main outcome question and, together with BH, SKI, and SW critically revised the analysis protocol and the manuscript. DK conceived the study, provided expert advice on analyses and critically revised the analysis protocol and the manuscript. All named authors contributed substantially to the manuscript and agreed on its final version.

Competing interests BSM receives an honorarium as a scientific advisor to the insurance company 'Die Techniker'. AH is member of the German Climate Change and Health Alliance (KLUG e.V.) and speaker of the section climate change and health of the German College of General Practitioners and Family Physicians (DEGAM). She does not receive payments from any of those organisations. The other authors have no competing interests to declare.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Heinrich-Heine-University Duesseldorf, Germany (HHU 5386/R). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. The data underlying this study are third-party data and are available to researchers on reasonable request from the corresponding author (sabrina.kastaun@med.uni-duesseldorf.de). All proposals requesting data access will need to specify how it is planned to use the data, and all proposals will need approval of the study team (DK, SKI, SKa) before data release.

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