PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Are people interested in receiving advice from their general practitioner on how to protect their health during heatwaves? A survey of the German population
AUTHORS	Kastaun, Sabrina; Herrmann, Alina; Müller, Beate; Klosterhalfen, Stephanie; Hoffmann, Barbara; Wilm, Stefan; Kotz, Daniel

VERSION 1 – REVIEW

REVIEWER	Ravanelli, Nicholas Lakehead University
REVIEW RETURNED	12-Jul-2023

GENERAL COMMENTS	The submitted manuscript explores the interest among the general population (+14 – 96 y) in Germany to seek information from general practitioners on heat-health advice. In sum, they found 25% of their sample were interested in receiving advice from their GP about heat-related interventions and protection strategies, with positive associations with female, age, low education, urban resident, and reduced income, which are linked to many of the most vulnerable groups during extreme heat exposure. I think this manuscript provides new insights into the needs and desire of the population regarding information to protect oneself from the potentially negative consequences of extreme heat, and highlights how GPs could be a line of defence, among many, in the heat health action plans for our communities. The authors have presented the findings clearly and succinctly. Please see my specific comments below: For style, I would suggest sticking with 'heatwaves' or 'heat waves'. It is used interchangeably throughout the manuscript. Abstract: Consider removing significantly from starting objective line. Consider removing "This study aims to answer these questions" as I think it is implied. Bullet # 5; Page 4: This statement is unclear, and I am unsure how this is a strength/limitation of the study. Methods: In your single additional question to the larger survey, were participants able to select more than 1 option? Rank on a Likert scale? Order importance? I appreciate it states this in the Table caption (single answer only), and in the strength and limitations, but consider explaining it more thoroughly in the methods.

REVIEWER	Vanderplanken, Kirsten
REVIEW RETURNED	13-Jul-2023

GENERAL COMMENTS	I have evaluated the manuscript on a study that assesses the interest of the public in receiving GP advice on health protection during heatwaves. While I agree that heatwave protection and the role of GPs are very important and timely topics, I do have major concerns with the topic as it is addressed here. 1. The introduction provides a broad introduction into the negative impacts of heatwaves, vulnerable groups and the potential role of GPs, but important information is missing: a. please explain how the WHO recommendations were adopted in Germany, specifically relating to GPs; b. you mention the importance of risk awareness in the public, please include literature on how risk perceptions and awareness of the public and specific vulnerable groups may affect implementation of measures and information seeking behavior. 2. I have a major concern with the formulation and relevance of the research question. a. The authors argue that for the development of effective measures it is important to explore the interests of the patients in receiving advice on health protection during heatwaves, but mention that interest in receiving advice depends on risk awareness. Please explain why it is more relevant to assess the interest in information instead of risk awareness or knowledge on heat health risks and protective measures. b. Without information on the public's risk awareness (which was not surveyed) and knowledge base, how do the study results need to be interpreted and what is their relevance? The advice patients are interested in, is not necessarily the advice they need. 3. Results section: a. Please explain why respondents without GP contact were excluded from the analysis. Do they differ significantly from the groups who answered yes/no? It may be interesting to include them in table 1. b. The mixed use of weighted and unweighted data is confusing and makes it harder for readers to compare and draw conclusions across the 3 research questions. c. Discussion on table 3: the argument of only including age and sex because these are easy to recognize are not valid. GPs also have information on location, at least based on their own location, and are very likely to also have information on household, education, etc. following from the nature of their patient-relations (personal, recurrent, often across multiple generations). I would like to see these included in table 3 as well. 4. Discussion: a. The numbers in lines 9-11 page 11/16 differ from what was mentioned in the introduction, though the same reference is cited. b. The authors mention that their study provides practical orientation for GPs on what topic people are interested in, but I find this is still very much lacking. How should GPs deal with the insights from the study? Can you formulate practical recommendations?

REVIEWER	OConnell, Emer UK Health Security Agency, Extreme Events and Health Protection team
REVIEW RETURNED	16-Jul-2023

GENERAL COMMENTS	SUMMARY

	This is a helpful and timely paper, highlighting the important role that GPs play in providing advice and support to vulnerable patients, raising awareness of the risks to their health. The paper would benefit from additional editing to shorten the length and to clarify the key messages, particularly in relation to GPs and their practice. For example, - The results indicate that even among higher risk groups (older age), there is limited expressed interest in receiving advice from the GP but the interest is greater in some groups, particularly some that are at highest risk (eg on multiple medications) - should GPs prioritise advice to these groups? - The suggest that the advice given should be tailored to the priorities expressed in the survey, this warrants discussion (Page 11, lines 12-22). Whilst the authors also state that other factors should be taken to account, is the evidence presented in this paper of sufficient quality, strength and clarity to guide clinical care? - Does the relatively low interest in receiving advice indicate limited understanding and therefore a role for GPs to raise awareness? - A consideration of the role of risk perception in relation to behaviour change would help to contextualise the findings; for example, there is evidence that individuals often mischaracterise their own level of risk and this is a barrier to taking action- how do these findings relate to that evidence and how might that inform GPs practice and how they can engage effectively with patients on this topic? STUDY SAMPLE The representative sample is a strength of the study. A consideration of potential bias related to the exclusion of non-privately owned households (eg private v's rental) - the rental sector can be associated with poorer quality housing, including poorer insulation which may affect indoor overheating risk.

VERSION 1 – AUTHOR RESPONSE

<u>Reviewer 1:</u> Dr. Nicholas Ravanelli, Lakehead University

Comments to the Author:

The submitted manuscript explores the interest among the general population (+14 – 96 y) in Germany to seek information from general practitioners on heat-health advice. In sum, they found 25% of their sample were interested in receiving advice from their GP about heat-related interventions and protection strategies, with positive associations with female, age, low education, urban resident, and reduced income, which are linked to many of the most vulnerable groups during extreme heat exposure. I think this manuscript provides new insights into the needs and desire of the population regarding information to protect oneself from the potentially negative consequences of extreme heat, and highlights how GPs could be a line of defence, among many, in the heat health action plans for our communities. The authors have presented the findings clearly and succinctly. Please see my specific comments below:

1. **For style, I would suggest sticking with 'heatwaves' or 'heat waves'. It is used interchangeably throughout the manuscript.**

RESPONSE: Thanks for this suggestion. We now stick with “heatwave” throughout the manuscript.

CHANGES TO THE MANUSCRIPT: Please see for example page 11, lines 20 and 23.

Abstract:

2. **Consider removing significantly from starting objective line.**

RESPONSE: Thanks for this suggestion. We have revised this sentence and deleted the term “significantly”.

CHANGES TO THE MANUSCRIPT: Page 2, line 3 – 6: “Climate Change increases frequency, intensity and length of heatwaves, which puts a particular strain on the health of vulnerable population groups.”

3. **Consider removing “This study aims to answer these questions” as I think it is implied.**

RESPONSE: Thanks for this suggestion. We have removed this sentence.

CHANGES TO THE MANUSCRIPT: Please see track changes on page 2, line 8.

4. **Bullet # 5; Page 4: This statement is unclear, and I am unsure how this is a strength/limitation of the study.**

RESPONSE: We agree with the reviewer that this statement was presented in an unclear manner. In concordance with reviewer 2, we see the lack of data on risk awareness as a limitation of our study. We have tried to clarify this statement.

CHANGES TO THE MANUSCRIPT: Page 3, line 13: “No data were collected on risk awareness regarding adverse effects of heatwaves, which might be a prerequisite for the interest in GP advice on preventive measures against heat.”

Methods:

5. **In your single additional question to the larger survey, were participants able to select more than 1 option? Rank on a Likert scale? Order importance? I appreciate it states this in the Table caption (single answer only), and in the strength and limitations, but consider explaining it more thoroughly in the methods.**

RESPONSE: Thank you for pointing this out. We have now aimed to present this information in more detail in the Methods section.

CHANGES TO THE MANUSCRIPT: Page 6, line 29 – 32: “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."

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Reviewer 2: **Kirsten Vanderplanken**

I have evaluated the manuscript on a study that assesses the interest of the public in receiving GP advice on health protection during heatwaves. While I agree that heatwave protection and the role of GPs are very important and timely topics, I do have major concerns with the topic as it is addressed here.

1. **The introduction provides a broad introduction into the negative impacts of heatwaves, vulnerable groups and the potential role of GPs, but important information is missing:**
    a. **please explain how the WHO recommendations were adopted in Germany, specifically relating to GPs;**

RESPONSE: Thank you for this suggestion. We have added a paragraph on this to the Introduction section, including very recent information on a new national heat health protection plan and references.

CHANGES TO THE MANUSCRIPT:
Page 4, line 27 – 36: "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 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, geeral practitioners, hospitals, and the health care 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]."

    b. **you mention the importance of risk awareness in the public, please include literature on how risk perceptions and awareness of the public and specific vulnerable groups may affect implementation of measures and information seeking behavior.**

RESPONSE: Thank you for this suggestion. Reviewer 3 also suggested to include some information on the fact that individuals often misjudge their own level of risk, and that this misperception is a barrier to taking action. We have therefore added information on this issue including literature (e.g., referring to the Health Belief Model) to our Discussion section.

CHANGES TO THE MANUSCRIPT:
Page 12, line 5 – 9: "The data thus also point out a substantial potential 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 (e.g., seeking advice) [1, 2]. GPs can thus play an important role to strengthen individual awareness among their patients."

2. **I have a major concern with the formulation and relevance of the research question.**
    a. **The authors argue that for the development of effective measures it is important to explore the interests of the patients in receiving advice on health protection during heatwaves, but mention that interest in receiving advice depends on risk awareness. Please explain why it is more relevant to assess the interest in information instead of risk awareness or knowledge on heat health risks and protective measures.**

RESPONSE: We are sorry for this misunderstanding. We don't think that it is more important or relevant to assess the interest in information instead of risk awareness or knowledge on heat health risks and protective measures. We agree that awareness of risks is the basis for action (feel the need/wish for advice, seeking advice). However, investigating awareness was not possible in the framework of this study.

The aim of our study was to explore the wish/interest in advice. Our results thus provide information on the public's actual interest in receiving advice from their GP. We don't have any data on why respondents are or aren't actually interested in advice. The same is true for the type of advice. We therefore mention and further discuss this lack of knowledge on risk awareness of respondents in our Limitation section. As reviewer 3 had also briefly commented on this issue, we have added further information on the fact that individuals often underestimate their own level of risk which poses a barrier to taking action (e.g., seeking advice) (with reference to the Health Belief Model).

CHANGES TO THE MANUSCRIPT: Page 12, line 5 – 9: "The data thus also point out a substantial potential 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 (e.g., seeking advice) [1, 2]. GPs can thus play an important role to strengthen individual awareness among their patients."

b. Without information on the public's risk awareness (which was not surveyed) and knowledge base, how do the study results need to be interpreted and what is their relevance? The advice patients are interested in, is not necessarily the advice they need.

RESPONSE: Thanks for pointing this out. Please see our response to your comment 1b and comment 2.

CHANGES TO THE MANUSCRIPT: Please see "changes to the manuscript" in our answer to your comments 1b and 2.

3. **Results section:**
    a. Please explain why respondents without GP contact were excluded from the analysis. Do they differ significantly from the groups who answered yes/no? It may be interesting to include them in table 1.

RESPONSE:
The aim of our study was to explore among people with GP contact the interest in receiving GP advice on protective health behaviour during heatwaves. In particular, to assess actual needs in general practice. People without GP contact were therefore not target of our interest. Our main outcome question on "interest in GP advice" was designed accordingly. Response option

8 was: “I do not see a general practitioner”. A relatively small group of persons (n=128, 3% of the total sample) gave this answer. As we could only use one single item, we were not able to separate the groups with and without a GP out. Hence, we don’t have data on the latter group’s wish/interest in receiving advice from their GP. This decision to exclude these respondents had been pre-specified in our analysis protocol prior to analysing the data.
Based on your question we compared respondents with to those without GPs. Respondents without GP contact were on average 8 years younger, more often men, and were more often from the lowest income group compared to those with GP contact. We have included a sentence on this comparison in our Results section and added further information to the Discussion section.

CHANGES TO THE MANUSCRIPT:
Page 8, line 37 – 39: “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 to those with GP contact.”

Page 13, line 13 – 14: “Our study was conducted in people with GP contact. There is also a small proportion of people who don’t see a GP, but these have not been included here.”

b. The mixed use of weighted and unweighted data is confusing and makes it harder for readers to compare and draw conclusions across the 3 research questions.

RESPONSE: Thank you for letting us know that this is difficult to understand. We agree that it can be somewhat confusing that some of the results were presented using weighted data while others were presented using unweighted data. We therefore describe in detail which research question was analysed using weighted or unweighted data, we also explain this decision (statistics section).
Our decisions on using weighted or unweighted data were derived according to the needs of the conducted analysis and published in our analysis protocol prior to analysing the data: https://osf.io/ycz7n. As all 3 research questions require different types of analyses (analysis of prevalence, analysis of associations) and refer to at least two different samples (total sample and subsample) different approaches were required.

CHANGES TO THE MANUSCRIPT: We checked the manuscript and added information on whether or not data was weighted in every table. Please see for example Table 2.

c. Discussion on table 3: the argument of only including age and sex because these are easy to recognize are not valid. GPs also have information on location, at least based on their own location, and are very likely to also have information on household, education, etc. following from the nature of their patient-relations (personal, recurrent, often across multiple generations). I would like to see these included in table 3 as well.

RESPONSE: We agree that GPs also have other information on their patients’ background. However, GPs do not necessarily keep records of much of the background information of their patients (like income or level of education) and would thus have to ask for it from the patient first.
Before we planned our analyses, it was unclear whether the final sample size would be sufficiently large to perform subgroup analyses at all. Therefore, we decided to focus on two variables which have zero missing data in our household survey: age and sex. In addition, we considered these variables to be the two most easily identifiable variables for a GP during a consultation.
We describe this restriction to the two variables in our a priori analysis protocol: https://osf.io/ycz7n.
Moreover, in routine general practice, it is rather unlikely that a GP would decide on the basis of income or level of education which topic to address when giving advice, but rather on the basis of age and sex (and associated illness which we did not measure). We therefore prefer to stick with the two variables in table 3.

CHANGES TO THE MANUSCRIPT: None.

4. **Discussion:**
   a. The numbers in lines 9-11 page 11/16 differ from what was mentioned in the introduction, though the same reference is cited.

RESPONSE: Thank you for the thorough reading of our manuscript. Indeed, we cite the numbers for regular advice in the Introduction section and for "at least occasional" (including regular advice) in the Discussion section. We have revised both paragraphs in order to clarify that we refer to different data from the same source.

CHANGES TO THE MANUSCRIPT: Page 5, line 24 – 25: "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".

Page 11, line 17 – 19: "….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 …".

b. The authors mention that their study provides practical orientation for GPs on what topic people are interested in, but I find this is still very much lacking. How should GPs deal with the insights from the study? Can you formulate practical recommendations?

RESPONSE: Thank you for pointing this out. Reviewer 3 also commented (see comment #2) on this point and asked the justified question whether the evidence of our more exploratory study is already sufficient to strongly guide clinical care. We can understand this objection and have therefore toned down our reference to practical guidance. As our study provides initial findings on this topic, it can be particularly helpful to inform further research in the field as a next step.

Referring to our findings that specific subgroups, particularly some that are at highest risk, seem to be more interested in receiving GP advice, reviewer 3 also questioned (see comment #1) whether GPs should prioritise advice to these groups (if there is a need for prioritisation). There might be a need for prioritisation in the future but – as described above – we agree with reviewer 3 and don't feel that our exploratory study with its initial findings should already guide clinical practice. We have therefore revised two sections of our Discussion section accordingly.

CHANGES TO THE MANUSCRIPT:
Page 11, line 19 – 23: "Thus, there seems to be substantial potential in implementing pre-summer medication check-ups and giving behavioural advice before and during heat waves [26, 27]. 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."

Page 13, line 19 – 23: "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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Reviewer 3: **Dr. Emer OConnell, UK Health Security Agency**

SUMMARY

This is a helpful and timely paper, highlighting the important role that GPs play in providing advice and support to vulnerable patients, raising awareness of the risks to their health. The paper would benefit from additional editing to shorten the length and to clarify the key messages, particularly in relation to GPs and their practice. For example,

1. **The results indicate that even among higher risk groups (older age), there is limited expressed interest in receiving advice from the GP but the interest is greater in some groups, particularly some that are at highest risk (eg on multiple medications) - should GPs prioritise advice to these groups?**

RESPONSE: Thank you for this suggestion and the corresponding comment in the pdf version of the manuscript (bmjopen-2023-076236-Proof-hi-eo).
With regard to your following comment #2, we have reconsidered the conclusions of our paper. We agree that evidence of our more exploratory study is not sufficient to strongly guide clinical care, and have therefore toned down our reference to practical guidance.
There might be a need for prioritisation in the future but – in accordance with your next comment – we don't feel that our exploratory study with its initial findings should already guide clinical practice.
We have revised two sections of our Discussion section accordingly.

CHANGES TO THE MANUSCRIPT:
Page 11, line 19 – 23: "Thus, there seems to be substantial potential in implementing pre-summer medication check-ups and giving behavioural advice before and during heat waves [26, 27]. 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."

Page 13, line 19 – 23: "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."

2. **The suggest that the advice given should be tailored to the priorities expressed in the survey, this warrants discussion (Page 11, lines 12-22). Whilst the authors also state that other factors should be taken to account, is the evidence presented in this paper of sufficient quality, strength and clarity to guide clinical care?**

RESPONSE: Thanks for pointing this out. We believe that our paper provides initial insights on priorities but also agree that – given the mentioned limitations – further research, including qualitative approaches, is needed to guide clinical care. We have revised this section.

CHANGES TO THE MANUSCRIPT: Page 11, line 19 – 23: "Thus, there seems to be substantial potential in implementing pre-summer medication check-ups and giving behavioural advice before and during heat waves [26, 27]. 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."

3. **Does the relatively low interest in receiving advice indicate limited understanding and therefore a role for GPs to raise awareness?**

RESPONSE: While we believe that an interest that is expressed by around every fourth person seeing a GP is not necessarily to be considered low, we agree that there is substantial potential to raise awareness among the population on heat-induced health effects. GPs can play an important role in this process. We have included a small paragraph on this position in our discussion section.

CHANGES TO THE MANUSCRIPT:

Page 12, line 4 – 9: “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 potential 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 (e.g., seeking advice) [44, 45]. GPs can thus play an important role to strengthen individual awareness among their patients.”

4. **A consideration of the role of risk perception in relation to behaviour change would help to contextualise the findings; for example, there is evidence that individuals often mischaracterise their own level of risk and this is a barrier to taking action- how do these findings relate to that evidence and how might that inform GPs practice and how they can engage effectively with patients on this topic?**

RESPONSE: Thank you for this question. We agree with the role of risk perception in relation to behaviour change and have added information and literature reference on its relevance to our discussion section (included in the paragraph which we have added as a response to your comment #3).

CHANGES TO THE MANUSCRIPT:
Page 11, line 34 – 35: “In this context, it is known that individuals often underestimate their own level of risk which poses a barrier to taking action (e.g., seeking advice) [44, 45]. GPs can thus play an important role to strengthen individual awareness among their patients.”

STUDY SAMPLE

5. **The representative sample is a strength of the study. A consideration of potential bias related to the exclusion of non-privately owned households (eg private v's rental) - the rental sector can be associated with poorer quality housing, including poorer insulation which may affect indoor overheating risk.**

RESPONSE: We suppose that this might be a misunderstanding. With private households in Germany we mean either owned or rented private accommodations. Only institutionalised respondents living in non-private accommodations such as foster homes, homeless shelters, etc. were excluded. We have added information to clarify this.

CHANGES TO THE MANUSCRIPT: Page 6, line 13: … living in private households (rented or owned) across Germany.

In addition, Reviewer 3 provided many helpful comments to the Pdf version of the manuscript.

RESPONSE: Thank you so much for the careful reading of our manuscript. We have answered all off your comments in the pdf version of the manuscript (bmjopen-2023-076236-Proof-hi-eo), have accepted almost all suggested changes and corrected grammatical errors.

CHANGES TO THE MANUSCRIPT: Please see answers to the reviewers’ comments in the pdf version of the manuscript (bmjopen-2023-076236-Proof-hi-eo) attached. Changes to the manuscript such as of grammatical errors, were made in the revised “.docx” file of our manuscript using track changes.

VERSION 2 – REVIEW

REVIEWER	Ravanelli, Nicholas Lakehead University
REVIEW RETURNED	16-Aug-2023

GENERAL COMMENTS	The authors have gone a great job addressing the reviewer comments.

REVIEWER	OConnell, Emer UK Health Security Agency, Extreme Events and Health Protection team
REVIEW RETURNED	25-Aug-2023

GENERAL COMMENTS	I have suggested minor revisions to the updated draft, largely these are linguistic in nature. The updated version of the paper has accounted for my previous comments and I am content with it progressing for publication.