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Peer review history for:

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HOW TO CITE:

Assessing heat-related health perceptions in the minibus taxi industry in Tshwane, South Africa [peer review history]. *S Afr J Sci.* 2024;120(11/12), Art. #18030. <https://doi.org/10.17159/sajs.2024/18030/peerreview>

Reviewer B: Round 1

Date completed: 21 June 2024

Recommendation: Accept / **Revisions required** / Resubmit for review / Decline

Conflicts of interest: None

Does the manuscript fall within the scope of SAJS?

Yes/No

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

Yes/No

Does the manuscript contain sufficient novel and significant information to justify publication?

Yes/No

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?

Yes/No

Is the research problem significant and concisely stated?

Yes/No

Are the methods described comprehensively?

Yes/No

Is the statistical treatment appropriate?

Yes/No/Not applicable/**Not qualified to judge**

Are the interpretations and conclusions justified by the research results?

Yes/**Partly**/No

Please rate the manuscript on overall contribution to the field

Excellent/**Good**/Average/Below average/Poor

Please rate the manuscript on language, grammar and tone

Excellent/**Good**/Average/Below average/Poor

Is the manuscript succinct and free of repetition and redundancies?

Yes/No

Are the results and discussion confined to relevance to the objective(s)?

Yes/No

The number of tables in the manuscript is

Too few/**Adequate**/Too many/Not applicable

The number of figures in the manuscript is

Too few/Adequate/Too many/Not applicable

Is the supplementary material relevant and separated appropriately from the main document?

Yes/No/Not applicable

Please rate the manuscript on overall quality

Excellent/**Good**/Average/Below average/Poor

Is appropriate and adequate reference made to other work in the field?

Yes/No

Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?

Yes/No/Not applicable

If accepted, would you recommend that the article receives priority publication?

Yes/No

Are you willing to review a revision of this manuscript?

Yes/No

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Comments to the Author:

This is an interesting topic that is very relevant given the existing climate crisis. The authors chose a population that is understudied and often ignored so that is commendable. It would however been good for the authors to justify why the taxi industry was chosen over other modes of public transport (bus/train/flight) (81-82). Is it because of the size of the industry or was this a more convenient and accessible industry to study? It would have been good, if feasible, to compare the number of commuters accessing taxis vs bus vs train vs flights (an illustrative table) to justify targeting this industry to reach most affected populations.

The Barcelona study (52 – 53) speaks more to mitigation interventions (reduce motor vehicle usage, implement green infrastructure and promote physical activity) and does not necessarily support justification for this study.

The authors mention that public transport contributes to efforts to addressing climate change (60 -61). This is correct, however in the context of this study, the use of public transport is not a mitigation strategy but rather a socio-economic phenomenon where use is as a result of affordability. There is still a significant number of people using private cars and contributing to greenhouse gases in SA.

The study site was chosen for safety reasons (92 – 95). However, the site has shades and seating. This isn't a common finding in other taxi ranks. Could this not impact on the findings and the generalisability of the study?

The symptom questionnaire (112 -119), care should be taken to not draw causality between the symptoms and heat. Perhaps this could have been mentioned as a limitation?

Study methods: The authors need to describe the study methodology more comprehensively, e.g. this is a prospective quantitative cross sectional study....., add inclusive/exclusion criteria etc. Also, the authors should justify why the specific statistical analysis was chosen. A brief description of RedCap would have been useful.

Results: A brief summary of descriptive statistics would have been useful. The table was included but not explained. For instance, it would have been worth noting that the majority of the commuters were male between the ages of 26 – 35 yrs. It would have been interesting to note that this population isn't reported to be the most vulnerable to heat stress, thus making the findings of this study valuable if they were the most affected, or not. It would have therefore been good to disaggregate the findings by age and gender.

It would have also been useful to disaggregate the findings by commuters vs drivers to see if there were any differences. Drivers would have had longer duration of exposure to heat compared to commuters?

Paragraph 209 alludes to driver specific challenges but a comparative analysis would have been more useful and informative.

The statement: Most participants reported that they felt hot when 142 travelling in a minibus taxi, regardless of whether it was in the morning or the afternoon (141 – 142), It is important to note that the morning referred to here is 11:00, almost midday.

Paragraphs 169 – 189: This is a description of the interventions, which is good, but is beyond the scope and objectives of this study? It is also unfortunate that the authors could not evaluate the effectiveness of the interventions although this was also not in the study objectives.

I agree with the authors that a quantitative assessment of temperature in the minibus taxis and taxi ranks would have given more insight to heat exposure in these settings and allowed for triangulation of data and validation of findings.

Statement (227 – 229): Moreover, more elaborate interventions, such as infrastructural changes, are likely needed to protect the health and well-being of the residents of the CoT, and communities elsewhere, from the risks associated with heat exposure. This is a broad statement and is not aligned to the study objectives. Perhaps the authors should make recommendations of infrastructural changes in the context of the Tshwane Taxi Industry?

In summary, this is a good insightful study and adds to the body of knowledge on the impact of heat on the health in a population rarely studied. The authors however need to pay more attention to study methodology, description, interpretation, discussion and generalisability of results in line with study objectives.

Author response to Reviewer B: Round 1

This is an interesting topic that is very relevant given the existing climate crisis. The authors chose a population that is understudied and often ignored so that is commendable. It would however been good for the authors to justify why the taxi industry was chosen over other modes of public transport (bus/train/flight) (81-82). Is it because of the size of the industry or was this a more convenient and accessible industry to study? It would have been good, if feasible, to compare the number of commuters accessing taxis vs bus vs train vs flights (an illustrative table) to justify targeting this industry to reach most affected populations.

AUTHOR: We chose the taxi industry as it is the most popular means of transport, making up 67% of public transport users, who are amongst the low-income population in South Africa. Formal transportation such as trains and busses in South Africa are not adequate or as accessible to townships where the poorer people live. It is for these reasons that the informal taxi industry developed, and the industry is currently the largest passenger transport industry in the country.

We have included a few sentences (line 74), highlighting the popularity of taxis versus other trains and buses to better justify our choice as follows:

“In South Africa, 67% of public transport passengers use minibus taxis and the industry is the most popular means of transport in South Africa, surpassing both trains (13%) and buses (20%).²¹ The majority of users are the low-income population, who live in townships that are not well served by formal transportation, such as buses and trains.”

The Barcelona study (52 – 53) speaks more to mitigation interventions (reduce motor vehicle usage, implement green infrastructure and promote physical activity) and does not necessarily support justification for this study.

AUTHOR: We thank the reviewer for their feedback. The Barcelona study demonstrates how reducing motor vehicle usage, implementing green infrastructure, and encouraging physical activity can enhance

public health and mitigate heat in urban areas. We will revise our manuscript to better connect these findings with the justification for focusing on heat exposure in the minibus taxi industry.

We have added the underlined phrase to the existing sentence on line 54 as follows:

“A study analysing disease burden in the urban areas of Barcelona found that reducing motor vehicle usage, implementing green infrastructure, and encouraging physical activity could enhance public health outcomes and reduce air pollution and heat in cities, highlighting the potential benefits of similar interventions in the minibus taxi industry to mitigate heat exposure and improve health in urban settings.”

The authors mention that public transport contributes to efforts to addressing climate change (60 -61). This is correct, however in the context of this study, the use of public transport is not a mitigation strategy but rather a socio-economic phenomenon where use is as a result of affordability. There is still a significant number of people using private cars and contributing to greenhouse gases in SA.

AUTHOR: We thank the reviewer for their comment. We partly agree to the comment as this study centres on commuters and drivers in minibus taxis, who have a specific socio-economic profile, but it is not the focus of our study. Rather, our study addresses the heat exposure vulnerabilities of commuters who use taxis and drivers who are a part of the minibus taxi industry, focusing on minibus taxis and ranks, given their significant impact on this sample population. This directly addresses climate change impacts. We found that commuters, drivers, and marshals experience adverse health effects from heat and suggest interventions such as increased shade and water provision given the survey findings. This study aims to inform interventions to prevent adverse health impacts from heat in the City of Tshwane, rather than focusing on public transport as a mitigation strategy.

The study site was chosen for safety reasons (92 – 95). However, the site has shades and seating. This isn't a common finding in other taxi ranks. Could this not impact on the findings and the generalisability of the study?

AUTHOR: We acknowledge that the study site has shade structures and seating, which are not present at all taxi ranks. In general, the results show that even with the shading and seating, heat health effects were apparent in the participants, who suggested “more trees, extend existing shelters, more shady trees, access to drinking water, eat ice, keep the minibus taxi door open while the minibus taxi is waiting at the minibus taxi rank, use an umbrella for shade when waiting for a minibus taxi” and “add shade / more shelters with benches, plant trees, add water taps, have a building with air conditioning to wait inside, and have water mist sprays.” Thus, it should be apparent that at taxi ranks where shading is not available to commuters and drivers, heat effects are much worse. This should be highlighted in the discussion.

We have amended the sentence as follows:

“It was acknowledged that this taxi rank was different from other ranks in that it had shade structures and seating, unlike some other ranks in the City; however, the commuters and drivers would be similar to those visiting other ranks.”

The following sentences have been added to the discussion (line 207):

“Moreover, despite the existing shading at the study site, commuters indicated a need for additional trees and shade structures to address the persistent heat issues. Thus, enhancing shading infrastructure across all ranks is essential to mitigate heat exposure effectively, especially at taxi ranks that lack trees and shading.”

The symptom questionnaire (112 -119), care should be taken to not draw causality between the symptoms and heat. Perhaps this could have been mentioned as a limitation?

AUTHOR: We appreciate the reviewer's feedback. We would like to clarify that the symptom questionnaire specifically asked participants about symptoms experienced "when they feel hot in the minibus taxi," which directs them to consider heat as the context for their responses. During recruitment, we ensured participants understood the study's focus on heat-related symptoms. The listed symptoms (sweating, heat cramps, headaches, faster heartbeat, nausea/vomiting, heat rash, heat exhaustion, dizziness/confusion, difficulties breathing, fainting, and irritability) are established indicators of heat illness. However, we acknowledge the importance of not inferring causality solely based on this questionnaire and will include

this as a limitation in our discussion.

We included a citation next to questions that ask about the heat illness symptoms to note that these are specific to heat illness in the manuscript.

We have added a section in the discussion as follows:

“While our study provides valuable insights into the prevalence and nature of heat-related symptoms among minibus taxi passengers, it is important to acknowledge certain limitations. One key limitation is the potential for misattribution of symptoms to heat exposure. Although the questionnaire was designed to ask participants about symptoms experienced “when they feel hot in the minibus taxi,” it is possible that some reported symptoms could have other underlying causes not related to heat. The reliance on self-reported data may introduce bias, as participants might not accurately recall or attribute their symptoms correctly. Furthermore, while the symptoms listed in our questionnaire are recognized indicators of heat illness (sweating, heat cramps, headaches, faster heartbeat, nausea/vomiting, heat rash, heat exhaustion, dizziness/confusion, difficulties breathing, fainting, and irritability), they can also be associated with other conditions. Therefore, care should be taken not to draw definitive causal relationships between the reported symptoms and heat exposure based solely on this questionnaire. To address this limitation, future studies could incorporate objective measures of heat exposure and physiological responses, such as temperature and heart rate monitoring, to more accurately determine the impact of heat on passengers' health. Additionally, longitudinal studies could help establish clearer causal links between heat exposure and specific health outcomes.”

The authors need to describe the study methodology more comprehensively, e.g. this is a prospective quantitative cross sectional study....., add inclusive/exclusion criteria etc. Also, the authors should justify why the specific statistical analysis was chosen. A brief description of RedCap would have been useful.

AUTHOR: We have now provided a more comprehensive description of our study methodology, including the type of study, inclusion/exclusion criteria, and justification for the statistical analysis used. Additionally, a brief description of RedCap will be added.

The underlined text was added to the methods section as follows:

“Procedures

We carried out a cross-sectional survey study to assess heat experiences among commuters and the taxi industry. Fieldworkers spent five days (5-9 December 2022) at the Castle Gate minibus taxi rank and invited people to participate in the survey. Participants were provided with an information sheet and provided informed consent prior to participation in the survey.”

“Statistics

Fieldworkers used tablets to record answers from study participants. Participants' answers were recorded using REDCap^{24,25} software installed on each tablet. REDCap is a secure web application designed for the collection and management of research data.²⁵ It is a versatile and efficient tool, widely adopted by researchers to streamline their data workflows and ensure high-quality, compliant research practices. All data were processed for quality control prior to being imported into Stata version 107 for analysis. Descriptive statistics were calculated and open answers were collated by themes identified from the participants' responses. The results of this study will serve as a basis for future studies examining the heat-health effects when travelling or working in minibus taxis. Thus, descriptive statistics were used for the effectiveness in summarizing and presenting the survey data, ensuring data quality, and providing actionable insights into the heat experiences of commuters and the taxi industry.”

A brief summary of descriptive statistics would have been useful. The table was included but not explained. For instance, it would have been worth noting that the majority of the commuters were male between the ages of 26 – 35 yrs. It would have been interesting to note that this population isn't reported to be the most vulnerable to heat stress, thus making the findings of this study valuable if they were the most affected, or not. It would have therefore been good to disaggregate the findings by age and gender.

AUTHOR: The results were delineated into several sections.

The following sections have been added to the results:

Heat Exposure and Health Effects Among Commuters

A substantial percentage of commuters (75%) reported feeling hot sometimes when traveling in a minibus taxi, with an additional 22% always feeling hot. At 11h00 in the morning, 65% of commuters sometimes felt hot, while at 15h00 in the afternoon, the percentage of those who sometimes or always felt hot increased to 94%. To cool down, 81% of commuters reported taking some action, with 87% opening a window and 78% drinking water. Common heat illness symptoms experienced in the morning included sweating (72%), headaches (27%), and dizziness/confusion (16%). In the afternoon, sweating (77%), headaches (32%), and dizziness/confusion (19%) remained prevalent. When standing at or walking through the minibus taxi rank in hot weather, 89% felt hot, experiencing symptoms such as sweating (84%), headaches (32%), and heat exhaustion (21%).

Heat Exposure and Health Effects Among Drivers

When traveling in a minibus taxi, 63% of drivers reported sometimes feeling hot, and 30% always felt hot. At 11:00 in the morning, 65% sometimes felt hot, whereas, at 15:00 in the afternoon, this reduced slightly to 50%. To alleviate the heat, 93% of drivers took actions such as drinking water (89%) and opening a window (82%). In terms of heat illness symptoms in the morning, sweating (56%) and dizziness/confusion (19%) were most common. While in the taxi ranks, 93% of drivers reported feeling hot, with sweating (67%), headaches (17%), and heat exhaustion (21%) being the predominant symptoms. These findings indicate that heat exposure is a significant concern for drivers, affecting their comfort and health both during transit and while waiting at the ranks.

It would have also been useful to disaggregate the findings by commuters vs drivers to see if there were any differences. Drivers would have had longer duration of exposure to heat compared to commuters? Paragraph 209 alludes to driver specific challenges but a comparative analysis would have been more useful and informative.

AUTHOR: We thank the reviewer for their insightful comment. We realise the value in comparing information from drivers versus commuters.

We have added the following section to our results:

Comparative Analysis Between the Experiences of Drivers and Commuters

There are notable differences and some similarities between the experiences of drivers and commuters regarding heat exposure and its effects. All 46 drivers surveyed were male, whereas commuters were more gender-diverse (54% male and 46% female). Drivers were more evenly distributed across age groups, while most commuters were aged 26-35 years (53%). A larger percentage of drivers (30%) reported "always feeling hot while traveling in a minibus taxi" compared to commuters (22%). At 11:00 in the morning, 20% of drivers "never felt hot," compared to only 12% of commuters. In the afternoon at 15:00, 41% of drivers "always felt hot," compared to 56% of commuters. A high percentage of both drivers (93%) and commuters (81%) reported taking action to cool down. Common actions included drinking water (89% drivers, 78% commuters) and opening windows (82% drivers, 87% commuters). Both groups reported sweating as the most common symptom in the morning (56% drivers, 72% commuters), followed by headaches (13% drivers, 27% commuters) and dizziness/confusion (19% drivers, 16% commuters). Only commuters' data are available for afternoon symptoms, showing high incidences of sweating (77%) and headaches (32%). A larger proportion of drivers (93%) felt hot at taxi ranks compared to commuters (89%). Symptoms at ranks were similar, with sweating being the most common (67% drivers, 84% commuters), followed by headaches (17% drivers, 32% commuters) and heat exhaustion (21% for both groups).

The statement: Most participants reported that they felt hot when travelling in a minibus taxi, regardless of whether it was in the morning or the afternoon (141 – 142), It is important to note that the morning referred to here is 11:00, almost midday.

AUTHOR: We thank the reviewer for their comment. We chose 11:00 as the morning to capture a period

when temperatures are already rising but still considered morning by many commuters' schedules. This timing ensures that the data reflects the heat exposure experienced during a "typical morning commute," which can be significant as the day progresses. Temperatures are known to rise to much higher values by the afternoon.

Paragraphs 169 – 189: This is a description of the interventions, which is good, but is beyond the scope and objectives of this study? It is also unfortunate that the authors could not evaluate the effectiveness of the interventions although this was also not in the study objectives.

AUTHOR: We acknowledge the reviewer's concern. The description of the interventions is included because the survey findings highlighted a need for solutions such as increased shading, access to water, and seating to mitigate heat exposure. These recommendations are directly based on the participants' responses.

We have moved this section to the discussion as follows:

Participants suggested several interventions to make minibus taxis and taxi ranks cooler, including more shelters with benches, planting trees, installing water taps, providing air-conditioned waiting areas, and using water mist sprays. Notably, some participants recommended using WhatsApp for disseminating information, which sparked the idea for an education campaign and awareness materials. We proposed all the participants' suggestions for interventions to the CoT and the TTI, each with its pros and cons. The CoT and TTI recommended an education campaign to raise awareness about heat-related health risks and mitigation strategies for minibus taxi commuters and drivers. This led to the development of the "Throw Shade on Heat this Summer" campaign, which included five materials: a car license sticker, a pull-out banner, a long sticker for above the minibus taxi door, a 2024 calendar, and a four-page flyer. The content, derived from existing literature^{4,32} and previous studies in South Africa, emphasized carrying water, wearing loose clothing, opening windows while traveling, recognizing heat illness symptoms, using umbrellas or hats, and caring for vulnerable individuals. These materials were distributed to minibus taxi commuters, drivers, marshals, and owners by the CoT and TTI. Although the materials were well-received, planned follow-up focus group discussions with the CoT and TTI were not possible due to unforeseen circumstances affecting the relationship between the parties at that time.

I agree with the authors that a quantitative assessment of temperature in the minibus taxis and taxi ranks would have given more insight to heat exposure in these settings and allowed for triangulation of data and validation of findings.

AUTHOR: We thank the reviewer and concur that a quantitative assessment of temperature would provide valuable insights.

Statement (227 – 229): Moreover, more elaborate interventions, such as infrastructural changes, are likely needed to protect the health and well-being of the residents of the CoT, and communities elsewhere, from the risks associated with heat exposure. This is a broad statement and is not aligned to the study objectives. Perhaps the authors should make recommendations of infrastructural changes in the context of the Tshwane Taxi Industry?

AUTHOR: We thank the reviewer for their comment. The need for infrastructural changes to the City of Tshwane is highlighted earlier in the discussion from participant suggestions, namely including more shelters with benches, installing water taps, and providing air-conditioned waiting areas. We humbly propose that these are clearly linked to our findings and recommendations in the manuscript and that there is no need to elaborate any further.

In summary, this is a good insightful study and adds to the body of knowledge on the impact of heat on the health in a population rarely studied. The authors however need to pay more attention to study methodology, description, interpretation, discussion and generalisability of results in line with study objectives.

AUTHOR: We thank the Reviewer for their constructive feedback. We have made extensive amendments in the revised manuscript.

Reviewer B: Round 2**Date completed:** 09 July 2024**Recommendation:** **Accept** / Revisions required / Resubmit for review / Decline**Conflicts of interest:** None

Does the manuscript fall within the scope of SAJS?

Yes/**No**

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

Yes/No

Does the manuscript contain sufficient novel and significant information to justify publication?

Yes/No

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?

Yes/No

Is the research problem significant and concisely stated?

Yes/No

Are the methods described comprehensively?

Yes/**No**

Is the statistical treatment appropriate?

Yes/No/Not applicable/Not qualified to judge

Are the interpretations and conclusions justified by the research results?

Yes/Partly/No

Please rate the manuscript on overall contribution to the field

Excellent/**Good**/Average/Below average/Poor

Please rate the manuscript on language, grammar and tone

Excellent/**Good**/Average/Below average/Poor

Is the manuscript succinct and free of repetition and redundancies?

Yes/No

Are the results and discussion confined to relevance to the objective(s)?

Yes/No

The number of tables in the manuscript is

Too few/**Adequate**/Too many/Not applicable

The number of figures in the manuscript is

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Is the supplementary material relevant and separated appropriately from the main document?

Yes/No/Not applicable

Please rate the manuscript on overall quality

Excellent/**Good**/Average/Below average/Poor

Is appropriate and adequate reference made to other work in the field?

Yes/No

Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?

Yes/No/Not applicable

If accepted, would you recommend that the article receives priority publication?

Yes/No

Are you willing to review a revision of this manuscript?

Yes/No

Select a recommendation:

Accept / Revisions required / Resubmit for review / DeclineWith regard to our policy on '[Publishing peer review reports](#)', do you give us permission to publish your anonymised peer review report alongside the authors' response, as a supplementary file to the published article? Publication is voluntary and only with permission from both yourself and the author.**Yes**/No

Comments to the Author:

The authors have satisfactorily responded to comments raised.

Reviewer A: Rounds 1 and 2

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