



Research article

Adapting to climate change: Strategies adopted by hypertensive patients – A qualitative study

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ABSTRACT

Introduction: Climate change contributes to health issues such as elevated blood pressure due to the body's response to extreme temperatures. Hypertensive patients require support to adapt to these climate impacts, making it essential to develop mitigation strategies to cope with extreme climate change as well as promoting adaptation to these impacts.

Material and methods: A qualitative phenomenological design was used, involving 15 hypertensive patients selected through homogeneous purposive sampling at selected public hospitals. Data were gathered via semi-structured, one-on-one interviews and analysed using Tesch's method.

Results and discussion: The following themes emerged from this study: (i) hypertensive patients' experiences of living with high blood pressure under changing weather conditions, (ii) their strategies to adapt to hypertensive conditions during extreme hot weather and suggestions to improve strategies to adapt to climate change. Findings highlighted a strong need for emotional and practical support to help manage their condition effectively.

Conclusions: Unpredictable climate changes complicate hypertensive patients' ability to adapt. The study recommends raising awareness, providing education on climate-health links, and building community capacity to support adaptation.

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1. Introduction

Climate change poses a significant threat to human health, particularly for individuals with hypertension [1]. Higher temperatures may lead to reductions in daytime and morning blood pressure, they are also associated with increases in nocturnal blood pressure that might result in increased risk of cardiovascular events such as stroke [2]. Reports from South Africa, including Department of Environmental Affairs (DEA) and Statistics South Africa, show that hypertension is increasingly a leading cause of death, especially in Limpopo Province, where it ranked third in 2017 [3,4]. The prevalence of hypertension has also surged from 21 % in 1998 to 77.3 % in 2008, influenced by urbanization, stress, dietary, and lifestyle changes, many of which are linked to climate change [5].

As weather patterns shift noticeably, adaptation strategies become essential [6]. Effective coping requires community support, access to relevant information, and the development of institutions and networks to plan and respond appropriately [7,8]. This study

seeks to evaluate how hypertensive patients are adapting to the health risks associated with climate change.

2. Material and methods

A qualitative descriptive design was used to explore how hypertensive patients adapt to the impacts of climate change.

2.1. Study site

The research was conducted in hospitals located in selected districts of Limpopo province, South Africa, known for experiencing extreme temperatures and serving hypertensive patients. Limpopo, the country's fifth-largest province, covers 10.3 % of South Africa's land area, with about 80 % of its population residing in rural areas [9].

2.2. Population and sampling

Participants were hypertensive patients attending public hospitals for chronic form renewals. Using homogeneous purposive sampling, 15 participants were selected, guided by data saturation.

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Table 1
Characteristics of participants.

Name of Hospital	No. Participants	Gender	Age	Education Level	Race	Marital status	Occupation	Monitored for HPT	Hospitalised with HPT
Mussina	2	1M 1F	2 Above 40	1T 1NS	2 African	2M	1E 1P	2M	2NH
Louis Trichards	2	2F	2 Above 40	1S 1P	2 African	2M	2P	1M 1NM	2NH
Letaba	1	1F	1 Above 40	1S	1 African	1M	1SE	1M	1NH
Sekororo	3	1M 2F	3 Above 40	2P 1NS	3 African	3M	3P	2M 1NM	1H 2NH
Dilokong	2	1M 1F	2 Above 40	1P 1NS	2 African	1M 1W	2P	1M 1NM	2NH
Jane Furse	2	2F	2 Above 40	2S	2 African	2M	2P	2M	1H
Mokopane	2	2F	2 Above 40	1S 1P	2 African	2M	2P	2M	2NH
Thabazimbi	1	1F	1 Above 40	1S	1 African	1C	1P	1M	1H
Total	N=15	M=3(20 %) F=12(80 %)	Above 40 =15(100 %)	T=1 (7 %) S = 6(40 %) P=5 (33 %) NS=3(20 %)	African =15(100 %)	C=1(7 %) M=13(%) W=1(7 %)	E =1(7 %) SE =1(7 %) P=13 (86 %)	M=12(80 %) NM=3(20 %)	3H =3(20 %) NH=12(80 %)

N = 15

Gender: Male =M, Female=F; Marital status: Co-habiting=C, Married=M, Widowed=W; Educational Level: Tertiary=T, Secondary =S, Primary = P and Never been to school = NS; Occupation: Employed=E, Self-employed=SE, Pensioner=P; Monitored; Yes=M, No=NM; Hospitalised:Yes =H, No = NH

2.3. Data collection

Data were collected through semi-structured one-on-one interviews, guided by the central question: “*Kindly describe your experiences of living with high blood pressure under changing weather conditions.*” Interviews lasted 30–40 minutes, were conducted in the participants’ preferred language, and recorded via field notes and audiotapes.

2.4. Ethics of approval

The study adhered to the Declaration of Helsinki guidelines and was approved by the University of Limpopo Research Ethics Committee (Ref: TREC/547/2022:PG) and the Limpopo Province Ethics Committee (NHRD). Gatekeeper permission was also obtained from hospital CEOs prior to the study. In this study, trustworthiness was ensured by applying Lincoln and Guba’s four criteria: credibility, transferability, dependability, and confirmability, as outlined by Korstjens and Moser [10]. Hypertensive patients gave voluntary verbal informed consent before the interviews.

2.5. Data analysis

Tesch’s method was used for data analysis, involving coding and categorizing transcripts into themes and sub-themes. Two themes emerged: (i) Hypertensive patients’ experiences of living with high blood pressure under changing weather conditions and their strategies to adapt to hypertensive condition during extreme hot weather; and (ii) suggestions to improve strategies to adapt to climate change [11].

3. Results

3.1. Demographic profile of the participants

A total of 15 hypertensive patients (100 %), all aged over 40, participated, consistent with findings of higher hypertension prevalence

among older adults [12]. The majority were females (80 %), with males (20 %), reflecting a greater prevalence among women [13]. All participants were African (100 %), aligning with research showing higher hypertension rates in Black populations [14].

Education Level: Secondary: 40 %,Primary: 33 %,No formal schooling: 20 % and tertiary: 7 %. Lower education levels were linked to higher hypertension risk [15]. Marital Status: Married: 86 %,Widowed and Cohabiting: 7 %.Employment Status: pensioners: 86 %, employed and self-employed: 7 %. Monitoring for Complications: Not monitored: 80 % and monitored: 20 %.Hospitalization with hypertension: Never hospitalized: 80 % and hospitalized: 20 %, this supports studies noting fewer hospitalizations during extreme heat [16] (Table 1).

4. Discussion

Two themes and five sub-themes of the hypertensive patients’ experiences of living with high blood pressure under climate change emerged from the study, as indicated in Table 2; these are discussed in detail below.

Theme 1. Hypertensive patients’ experiences of living with high blood pressure under changing weather conditions

Hypertensive patients reported varied experiences of living with high blood pressure during changing weather conditions, including: (i) Negative experiences of hot weather conditions, (ii) different experiences between hot and cold weather conditions and (iii) negative experiences of specific signs and symptoms (shivering, dizziness, headache and fatigue).

4.1. Sub-theme 1.1: Negative experiences of hot weather conditions

Participants reported negative experiences during hot weather and expressed concern about how extreme heat affects their hypertension, noting noticeable changes in their blood pressure during such conditions. This was supported by statements from study participants:

Table 2
Themes and subthemes

The themes and sub-themes that emerged from their studies are outlined in Table 2.

Themes	subthemes
1. Hypertensive patients’ experiences of living with high blood pressure under changing weather conditions	1.1 Negative experiences of hot weather conditions 1.2 Different experiences between hot and cold weather conditions 1.3 Negative experiences of specific signs and symptoms (shivering, dizziness, headache and fatigue)
2. Hypertensive patients’ coping strategies with hypertension during extreme hot weather	2.1 Hypertensive patients cope by eating a well-balanced diet 2.2 Hypertensive patients cope by taking Indigenous medication and food

“What I have experienced is that it is extremely hot in the summer “

Participant 3

The studies collectively highlight the heightened risks posed by climate change, particularly extreme heat, on both public health and health systems [17–20]. Ebi, Vanos, and Baldwin emphasized the increasing threat of frequent, intense, and prolonged heatwaves [18]. Zheng, Wang, and Cheng found a link between high daytime temperatures and elevated blood pressure, especially during hot seasons [19]. Myers, Tucker, and Young added that heat exposure significantly impacts hypertensive outdoor workers by lowering productivity through fatigue and the need for more breaks [20].

4.2. Sub-theme 1.2: Different experiences between hot and cold weather conditions

The study found that while participants experienced cold temperatures in winter, they were not concerned, as it did not appear to impact their health or blood pressure.

““Cold weather does not affect me, but hot weather does. It is unlike back then when I was not taking hypertension medication. When it was cold, I would still feel hot”

Participant 4

Contrasting results have been found in a study by Espeland, de Weerd, and Mercer who found that cold weather significantly stresses the heart by increasing its workload. In response to the cold, the body may enter cold shock, which raises blood pressure and reduces blood flow to the brain, potentially leading to cardiovascular complications [21].

4.3. Sub-theme 1.3: Negative experiences of specific signs and symptoms (shivering, dizziness, headache and fatigue)

During extreme heat, hypertensive patients experience various signs and symptoms, including shivering, dizziness, headache and fatigue. The participants' comments supported this sub-theme as highlighted below:

“When it's hot. . . I get tired and have a headache”

Participant 10

Extreme heat has impact on blood pressure regulation and overall cardiovascular health. Due to increased blood pressure, poor oxygen supply and cardiovascular strain, hypertensive patients might present with climate-related hypertension symptoms such as severe headache, blurred vision, light-headedness, fatigue, and weakness [22].

Theme 2. Hypertensive patients' coping strategies with hypertension during extreme hot weather

Hypertensive patients adopted some strategies to cope with extreme hot weather including (i) eating a well-balanced diet, and (ii) taking Indigenous medication, food and drinking lots of water.

4.4. Sub-theme 2.1: Hypertensive patients cope by eating well-balanced diet

Participants cope by eating a well-balanced diet. This is evident in the following participant comment:

“I think if patients reduce salt and red meat intake, their blood pressure will go down “

Participant 3

In support of this perception, DiNicolantonio and O'Keefe emphasized the importance of advocating for population-wide salt restriction as part of dietary guidelines [23]. A 2021 study in China also supported this, showing that dietary patterns can reduce the risk of hypertensive complications, particularly in vulnerable populations [24]. Xue, Cui, and Xi further highlighted that medical nutrition therapy is crucial for controlling blood pressure in hypertensive patients, stressing the need for a healthy, nutritionally balanced diet [25].

4.5. Sub-theme 2.2: Hypertensive patients cope by taking Indigenous medication and food and drinking lots of water

Hypertensive patients cope by taking indigenous medication and food. Participant comments supporting this sub-theme follow:

“I use self-treatment. I drink aloe and African potato... That is why I do not get complications from hypertension”.

Participant 2

“I just accept and be thankful that I am alive... I also drink lots of water, then I will feel better”

Participant 12

The study reveals that hypertensive patients adjust their behavior in response to extreme temperatures, with some increasing their water intake as a coping strategy for extreme heat. Lapau supports these findings, highlighting a link between increased water consumption and a reduction in systolic blood pressure as a way to adapt to heat. Drinking ample water, particularly in workplace settings during extreme heat, can help the body manage hypertension under heat stress effectively [26].

5. Limitations

The study was conducted in selected district hospitals in Limpopo Province, and its findings are specific to these hospitals, limiting the ability to generalize them to other public hospitals in South Africa. However, the methodologies used may inspire further research in different settings to enhance understanding of the topic. The study highlights the lack of literature on strategies used by hypertensive patients to adapt to climate change, indicating a need for more research in this area.

6. Conclusion

The study highlights the diverse experiences of hypertensive patients in the face of climate change, emphasizing the coping strategies they employ to adapt. Key strategies include maintaining a balanced diet and using indigenous medicines and foods. The study recommends providing education, capacity building, and raising awareness about available resources to support hypertensive patients in coping with the impacts of climate change.

Data Availability Statement

Data generated and analyzed during the current study are not publicly available due to ethical reasons but are available for corresponding authors.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Mmusi Salphy Mamoropo: Conceptualization, Data curation, Methodology, Project administration, Resources, Writing – original draft, Writing – review & editing. **Bopape Mamare Adelaide:** Conceptualization, Methodology, Supervision. **Mothiba Tebogo Maria:** Conceptualization, Supervision.

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