
Assessing Healthcare Professionals' Knowledge, Attitudes, and Perceptions of Climate Change: A Case Study of Bheki Mlangeni District Hospital, South Africa

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Abstract: The impacts of climate change on social determinants of health pose a critical threat to public health, with healthcare professionals playing a vital role in advocating for mitigation measures. This study assessed the knowledge, attitudes, and perceptions of healthcare professionals at Bheki Mlangeni District Hospital in Gauteng, South Africa. Using a quantitative, cross-sectional design, 264 randomly selected healthcare workers were surveyed through a self-administered standardized questionnaire. Findings show that most participants became aware of climate change through television, highlighting the influence of visual media, followed by radio (20.1%). Both knowledge and attitudes significantly influence practices. The pathway from knowledge to perception was positive and significant ($\beta = 0.277$; $p = 0.002$), indicating that increased knowledge enhances climate-related perceptions. Attitudes also significantly impacted practice ($\beta = 0.287$; $p < 0.001$), suggesting that positive attitudes strengthen engagement in mitigation efforts. While most participants recognized the reality of climate change and showed reasonable knowledge and attitudes, inconsistencies were noted, likely due to varied information sources and limited formal climate change education in healthcare curricula. The study emphasizes the need for strengthened climate change education within the health sector to address knowledge gaps and better equip professionals to contribute to mitigation efforts.

Keywords: climate change; climate impacts; extreme weather; healthcare; public health

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Introduction

Climate change, recognized by the World Health Organization (WHO) as the most significant health threat of the 21st century, is projected to cause an additional 250,000 deaths per year from 2030 to 2050 due to malnutrition, vector-borne diseases, waterborne diseases, and heat stress (World Health Organization 2021). Africa, despite its minimal contribution to global emissions, faces severe climate impacts, with South Africa identified as a climate change hotspot experiencing extreme weather events like the Durban floods and Cape Town droughts (González & Sánchez, 2022). Recent data from the South African Weather Service (SAWS) reported

record-breaking heatwaves, with temperatures peaking at 46.7°C in Upington, adversely affecting agriculture and leading to crop yield declines and livestock losses (Statistics South Africa, 2024).

The healthcare sector, responsible for 4.4% of global net emissions, significantly contributes to climate change through waste, energy consumption, and transportation (Kreslake et al., 2018). Consequently, healthcare professionals are uniquely positioned to lead climate change mitigation efforts due to their trusted status and their role in addressing public health issues (Kreslake et al., 2018). However, there are concerns regarding the extent of healthcare professionals' knowledge about the health impacts of climate change, as studies indicate varying levels of awareness and confidence in addressing these issues (Hathaway & Maibach, 2018). Kotcher et al. (2021) found that many people worldwide, including some healthcare professionals, are not aware of the health effects of climate change. This lack of awareness is consistent across different countries and regions, as noted in studies conducted in the USA, India, and Ontario (Sanderson & Galway, 2021; Sambath et al., 2022). Even when healthcare professionals acknowledge the health impact of climate change, they often have inadequate knowledge about it (Polit & Beck, 2008; Kotcher et al., 2021). This lack of awareness is also reflected in public opinion surveys (Leiserowitz, 2010) and studies among healthcare professionals in North America and Asia (Hathaway & Maibach, 2018). It is crucial to provide education to healthcare professionals about climate change and its impact on health to enable them to effectively prevent, alleviate, and manage the associated hazards (Shea et al., 2020).

In Canada, Sanderson & Galway (2021) reported that although health professionals recognise that climate change is a threat to human health, most feel somewhat uncomfortable and uncertain about engaging in climate action. According to Sambath et al. (2022), health professionals in India believe that it is their responsibility to tackle the repercussions of climate change. Similarly, André et al. (2022) reported that doctors in Switzerland acknowledged that they have a critical role to play in addressing the health impact of climate change with the patients, however, majority of the participants expressed a lack of confidence in providing advice to their patients about the possible health impact climate change. In another study, Polivka et al. (2012) reported that public health nurses in Ohio have a perception that the greater effects of climate change would be experienced in other areas and not within their jurisdiction. A significant factor exacerbating this attitude is climate change misinformation. Misinformation lowers public acceptance of the reality and seriousness of climate change, especially when it creates the illusion of scientific disagreement or features “false balance” in media coverage (Cook et al., 2017; Van der Linden et al., 2017). It polarizes attitudes, with individuals' pre-existing beliefs—such as political ideology or worldview—shaping how they process and respond to such content. Those already sceptical of climate change tend to become more entrenched in their views when exposed to misleading information (Treen et al., 2020; Zhou & Shen, 2022). Within healthcare settings, misinformation can distort healthcare professionals' understanding of climate-health linkages, ultimately weakening their advocacy, clinical responses, and policy engagement.

Despite global attention of climate change and its associated negative impacts, the existing research on healthcare professionals' knowledge of climate change in South Africa remains limited. While some studies have been conducted, they have certain limitations, such as failing to examine the perception of healthcare professionals. The other studies that were conducted only included a certain group of professionals and excluded others, for instance, the study conducted by Lister et al. (2022) only focused on Clinical Support and Therapeutic Services (CSTS) staff while Shezi et al. (2019) assessed the knowledge of a specific group of Environmental Health Practitioners (EHP). In another study conducted by Manga et al. (2022), the majority of the participants were Medical Doctors. The limited number of studies on the knowledge, attitudes, and perceptions of healthcare professionals toward climate change in South Africa highlights the need for more research in this area. Therefore, this study aims to fill the gaps by assessing the perspective of other healthcare professionals, including nurses, doctors, pharmacists, and Allied staff at Bheki Mlangeni District Hospital in Gauteng, South Africa.

Theoretical and conceptual framework

The Theory of Planned Behaviour (TPB), originally proposed by Ajzen (1991), provides a widely applied framework for understanding and predicting human behaviour across a range of contexts, including environmental and public health domains. The TPB posits that behaviour is primarily driven by behavioural intention, which is shaped by three key factors: an individual's attitude towards the behaviour, subjective norms surrounding the behaviour, and perceived behavioural control over performing it. In the context of climate change, the TPB has been extensively used to explore how individuals' knowledge and attitudes influence their intentions

and actions in relation to environmental stewardship and pro-environmental behaviour. Several studies have demonstrated the utility of the TPB for explaining climate-related behaviours. For example, Liu et al. (2020) found that environmental knowledge has a significant positive effect on environmental attitudes, which in turn positively influence behavioural intentions and actual pro-environmental behaviours. Similarly, McCauley et al. (2024) examined the relationship between healthcare professionals' knowledge of environmental issues and their engagement in sustainable practices. Their findings indicated that greater knowledge was associated with more favourable attitudes towards the adoption of sustainable practices in healthcare settings. These studies reinforce the view that knowledge forms a critical foundation for shaping attitudes, which subsequently drive behavioural intentions.

In the present study, the TPB provides a useful lens for understanding how healthcare professionals' knowledge and attitudes about climate change may influence their perceptions of its public health impacts. Drawing on research by Leiserowitz and Smith (2017), it is argued that individuals with more comprehensive knowledge of climate change tend to perceive it as a significant threat and are more likely to express heightened concern about its effects. Similarly, Xia et al. (2022) highlighted that knowledge not only informs attitudes but also fosters a sense of urgency and responsibility to act in response to climate change. These perspectives underscore the value of TPB in examining the pathways from knowledge and attitudes to healthcare professionals' perceptions of climate-related health risks. However, while the TPB offers explanatory power for the relationships among knowledge, attitudes, and behavioural intentions, it does not fully account for the complex dynamics of climate change misinformation in healthcare settings. Misinformation about climate change—such as inaccurate beliefs regarding the health impacts of climate-related phenomena or misleading narratives about the causes of climate change—can distort knowledge, shape attitudes, and ultimately hinder appropriate behavioural responses. Studies have noted that healthcare professionals exhibit varying levels of awareness and confidence in addressing climate-related health issues, partly due to inconsistent exposure to accurate information (Kotcher et al., 2021; Albrecht et al., 2023; Guihenneuc et al., 2024). This variability underscores the need for a more comprehensive theoretical framework that not only accounts for behavioural intention but also considers how healthcare professionals encounter, process, and resist misinformation.

To address this gap, this study integrates theories from communication science and misinformation research alongside the TPB. Specifically, Inoculation Theory (McGuire, 1964; Cook et al., 2017) provides insights into how healthcare professionals can be “immunized” against climate misinformation through exposure to pre-emptive refutations or weakened counterarguments. This theory suggests that building resilience to misinformation is essential for enabling healthcare professionals to maintain accurate knowledge and constructive attitudes in the face of misleading information. By combining the TPB with these complementary frameworks, this study provides a more solid conceptual basis for examining the interaction of knowledge, attitudes, perceptions, and exposure to information—including misinformation—among healthcare professionals. This integrated framework not only aids in predicting behavioural intentions but also guides interventions aimed at improving climate literacy, fostering positive attitudes, and strengthening resilience to misinformation within healthcare settings. Accordingly, the study proposes the following hypotheses:

H1: Knowledge about climate change positively influences healthcare professionals' perceptions of its public health impact.

H2: Attitudes towards climate change positively influence healthcare professionals' perceptions of its public health impact.

This integrated theoretical perspective adds to the broader discussion by emphasising the importance of addressing both educational and communication challenges in equipping healthcare professionals to engage significantly with climate change as a vital public health issue.

Materials and methods

The study was carried out at Bheki Mlangeni is a district hospital located in Jabulani Soweto Township, South of Johannesburg Gauteng, South Africa. The hospital has about 300 beds, a 24-hour emergency service and an operating theatre. It provides support to about 19 primary healthcare facilities in the Johannesburg district. The study applied a descriptive, quantitative cross-sectional study design to investigate the knowledge, attitude, and perception of healthcare professionals regarding climate change at Bheki Mlangeni District Hospital. The target population were all healthcare professionals employed at Bheki Mlangeni. This includes the following categories

of health professionals, Clinical Support and Therapeutic Services, Nursing, Doctors, Pharmacy and Dental. The hospital has a total of 643 healthcare professionals. To obtain the sample size, raosoft calculation was carried out to obtain the required sample size for each category of healthcare professionals. 200 nurses, 20 doctors, 27 CSTS staff, 15 pharmacists and 20 dental professionals formed part of this study. For each population stratum a 95% confidence interval and 5% margin of error and, 50% distribution was used to estimate the population size. Therefore, 385 health professionals formed part of the sample size.

The study applied a stratified random sampling method, which was considered appropriate because the targeted population was not homogeneous, and the researcher intended to ensure fair representation of all staff categories. The approach involved dividing the population into homogeneous subgroups or strata, in this case based on certain characteristics, in this case, participants were divided according to on the sample size calculated for each category of profession. Random selection of participants was then conducted using these numbers, ensuring equal opportunity for every healthcare professional to be included in the study. By applying this method, selection bias was avoided, and the findings were rendered more generalizable to the entire population of healthcare professionals at Bheki Mlangeni District Hospital. The data collection method used was a self-administered and close-ended questionnaire. The questionnaire assessed various aspects related to knowledge, attitude, and perception concerning climate change. The items used to measure these aspects have been adapted from previous studies conducted on climate change (Falaye & Okwilagwe, 2016; La Torre et al., 2023). Respondents had to provide their answers using a 5-point Likert scale, with response options ranging from “Strongly Disagree” (1) to “Strongly Agree” (5). Additionally, rating scale such as not at all confident (1), somewhat confident, confident, very confident and extremely confident (5). The use of this measurement scale has been demonstrated as effective for similar studies on knowledge, attitude, and perception by (Falaye & Okwilagwe, 2016; La Torre et al., 2023).

The questionnaire was adapted from previously validated instruments used in similar studies by La Torre et al. (2023), & Shezi et al. (2019), which contributed to enhancing its content and construct validity. To further strengthen content validity and ensure clarity and appropriateness for the target population, the researcher consulted with the institution’s Student Writing Centre for guidance on question phrasing and structure. Additionally, the questionnaire was reviewed by the Research Supervisor at the University of Johannesburg to assess its alignment with the research objectives and its relevance to the study context. To assess the reliability and practical clarity of the questionnaire in the study setting, a pilot study was conducted among 30 HCPs from various professional categories within the hospital. The pilot study helped to identify potential ambiguities and confirm the applicability of the questions across different respondent groups. No major flaws were identified, and thus no amendments to the questionnaire were required. The responses from the pilot study were excluded from the main analysis to preserve the integrity of the final dataset.

A participant number was assigned for every questionnaire. The information was summarised onto a spreadsheet, inputted into SPSS version 29, and analysed with the aid of a statistician. The findings were summarized with tables, graphs. Multiple regression analysis, making use of structural equation model was performed using AMOS version 29.

Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

Demographic Characteristics

The details of the demographic characteristics of the respondents in this study are shown in Table 1. The data indicates a predominantly female respondent (86.7%) base with a significant portion in the 25 to 34 age group (22%), most of whom hold a National Diploma (48.1%) and work in nursing (73.5%). The wide range of work experience (11.25 ± 9.01) suggests a diverse set of professional backgrounds and career stages among the respondents.

Table 1. Demographic characteristics of respondents

Variable	Frequency (n=264)	Percentage (%)
Gender		
Female	229	86.7
Male	32	12.1
Prefer not to say	3	1.1
Age group		
21 to 24	25	9.5
25 to 34	99	37.5
35 to 44	58	22.0
45 to 54	44	16.7
55 to 64	38	14.4
Education		
National Diploma	127	48.1
Degree	52	19.7
Honours	41	15.5
Masters	3	1.1
Others	41	15.5
Profession		
Nursing	194	73.5
Clinical Support and Therapeutic Services	30	11.4
Pharmacy	15	5.7
Doctor	23	8.7
Dentist	2	0.8
Work experience Mean \pm SD [11.25 \pm 9.01]		

Figure 1 provides insights into the sources from which respondents have heard about climate change. Among respondents who have indicated awareness of climate change, the primary sources of information vary, reflecting diverse channels of communication. The most prevalent source is television, constituting 30.6% of the total cases. This indicates that a significant portion of individuals became aware of climate change through television broadcasts, emphasizing the influential role of visual media in disseminating information. Following television, radio emerges as another prominent source, with 20.1% of the cases reporting it as their channel of awareness. This underscores the role of auditory media in contributing to the dissemination of information about climate change.

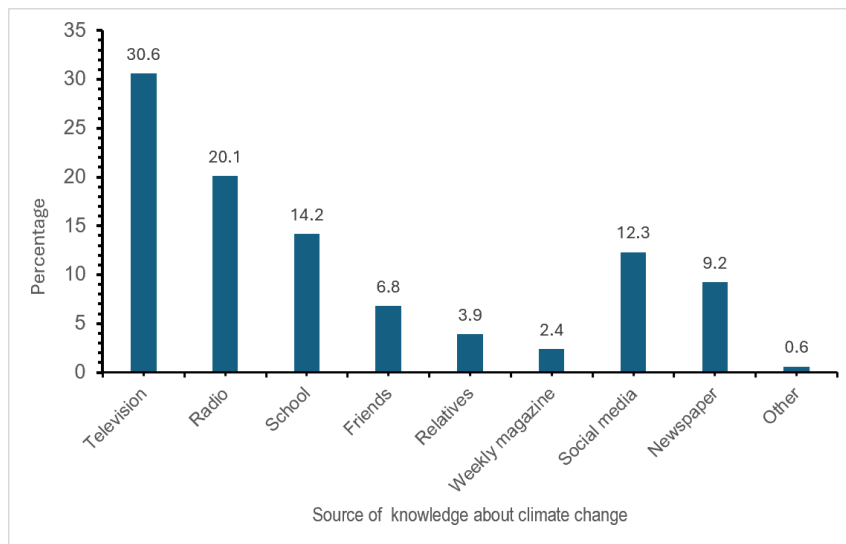


Figure 1. Insights into the sources of knowledge about climate change

School is identified by 14.2% respondents as a source of information, highlighting the educational setting as a significant platform for raising awareness about climate change. Other notable sources include friends, relatives, social media, and newspapers, each contributing to varying degrees to respondents' awareness of climate change.

A small percentage of respondents (0.6%) specified “Other” sources, indicating that there are additional, less common channels through which individuals have learned about climate change.

Empirical findings

Table 2 shows the results of a factor analysis conducted on a set of measured variables related to perceptions of Healthcare Professionals at Bheki Mlangeni District Hospital, Gauteng Province South Africa, regarding Climate Change. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to assess the dimensionality, reliability, and validity of the constructs. The measured variables are grouped into three constructs: knowledge of climate change, attitude towards climate change, and perception of climate change. The factor loadings for all items in the knowledge of climate change construct (K1- K4) are moderately high, ranging from 0.727 to 0.800, indicating that all items measure the same underlying construct of knowledge of climate change. The factor loadings ranging from 0.824 to 0.841 of the three measured items (A1–A3) suggest that they are highly correlated with the construct of attitude towards climate change. The factor loading for practice ranged from 0.616 to 0.875 of the three measured items (P1–P3) suggest that they are highly correlated with the construct of practices of climate change. The Cronbach’s alpha measured for the three constructs tested ranged from 0.722 (Perceptions of climate change) to 0.818 (Attitude towards climate change), which met the condition for internal consistency of the scale reliability supported by the work (Hair et al., 2010). The mean value measured for knowledge and attitudes generally suggests positive agreement.

Table 2. Factor Loading Coefficient, Mean and Standard Deviation of the Constructs and Cronbach’s Alpha

CONSTRUCT	Measured variables	Factor Loadings	Mean (SD)	Cronbach’s Alpha	
Knowledge of climate change	K1	Do you think climate change can have impact on the environment’s health?	,800	4.23 (0.949)	0.799
	K2	Do you think climate change can have impact on animal health?	,769	4.11 (1.019)	
	K3	Do you think climate change can have impact on human’s health?	,773	4.29 (0.939)	
	K4	Do you think climate change poses a significant threat to public health?	,727	4.13 (0.966)	
Attitude towards climate change	A1	Do you think that healthcare professionals have a responsibility to address climate change?	,824	3.59 (1.176)	0.818
	A2	Do you think health professionals have a role in addressing the public health impacts of climate change?	,828	3.59 (1.163)	
	A3	Do you think healthcare professionals should discuss about climate change with patients?	,841	3.50 (1.117)	
Perceptions	P1	Is climate change is really happening	,616	4.22 (0.788)	0.722

(Continued)

Table 2. (Continued)

CONSTRUCT	Measured variables	Factor Loadings	Mean (SD)	Cronbach's Alpha
	P2	Is climate change is a major public health threat?	,875	4.14 (0.895)
	P3	Does climate change directly impact the lives of patients?	,867	4.07 (0.865)

Variance=68.24%
 Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0.787
 Bartlett's Test of Sphericity= (p<0.001; X²=959.401; df=45)

Theoretical findings

The overall fit of the model was assessed by multiple fit criteria given in Table 3. The goodness of fitness indices are as follows: chi-square = 84.738, df = 32, p < 0.001, $\chi^2 / df = 2.648$, CFI = 0.943, IFI = 0.944, GFI=0.944, TLI=0.920, RMSEA = 0.079. In line with Hu and Bentler (1999), all criteria met the recommended values of the measurement model.

Table 3. Model fitness indices for the MM

Fit Indices	Fit values	Criteria
χ^2 / df (p-value)	2.648(<0.001)	<5
GFI	0.944	>0.9
IFI	0.944	>0.9
TLI	0.920	
CFI	0.943	>0.9
RMSEA	0.079	<0.08

Measurement model: Scale reliability and construct validity

Confirmatory factor analysis (CFA) was then applied to confirm the quality of the measurement models through an evaluation of convergent and discriminant validity. Table 4 reflects the composite reliability, convergent and discriminant validity of the measurement model. Convergent validity refers to “the extent to which a measure correlates positively with alternative measures of the same construct” (Hair et al., 2010). Criteria that were used to assess convergent validity including standardized loadings, construct (composite) reliability (CR) and the average variance extracted (AVE). The CR is a measure of the internal consistency or reliability of the latent factors in the SEM. All values of the CR range from 0.773 to 0.819, which suggests acceptable reliability. AVE assesses the amount of variance that a latent factor explains in its observed variables relative to the amount of measurement error. The measured constructs have AVE values in the range of 0.499–0.603, which is above the threshold of 0.5, except (knowledge). This suggests that the measured constructs have moderate level of convergent validity.

Table 4. Composite reliability, average variance extracted, and maximum shared square values

	CR	AVE	MSV	MaxR(H)	Attitude	Knowledge	Perception
Attitude	0,819	0,603	0,187	0,834	0,777		
Knowledge	0,799	0,499	0,187	0,801	0,432	0,706	
Perception	0,773	0,541	0,166	0,822	0,407	0,401	0,736

Discriminant validity refers to “the extent to which a construct is truly distinct from other constructs by empirical standards” (Hair et al., 2010). The MSV (Maximum Shared Variance) is a measure of the discriminant validity of a scale or a construct. It represents the maximum correlation between a construct and any other construct in the model. Values below AVE are desirable. The value of the AVE for each construct is greater than MSV values, which suggests adequate discriminant validity (Fornell & Larcker, 1981).

Structural equation model (hypotheses testing)

The MM model was then converted into a path model that shows the relationship between the latent variables. An SEM was applied to test all the hypothesized relationships that exist among the latent variables. The resulting

SEM with estimated standardized relationships is given in Figure 2. The goodness of fitness indices are as follows: chi-square = $\chi^2 = 84.738$, $df = 32$, $p < 0.001$, $\chi^2 / df = 2.648$, CFI = 0.943, IFI = 0.944, GFI=0.944, TLI=0.920, RMSEA = 0.079, which suggests that the measurement model is acceptable. It was thus concluded that the model was consistent with real data.

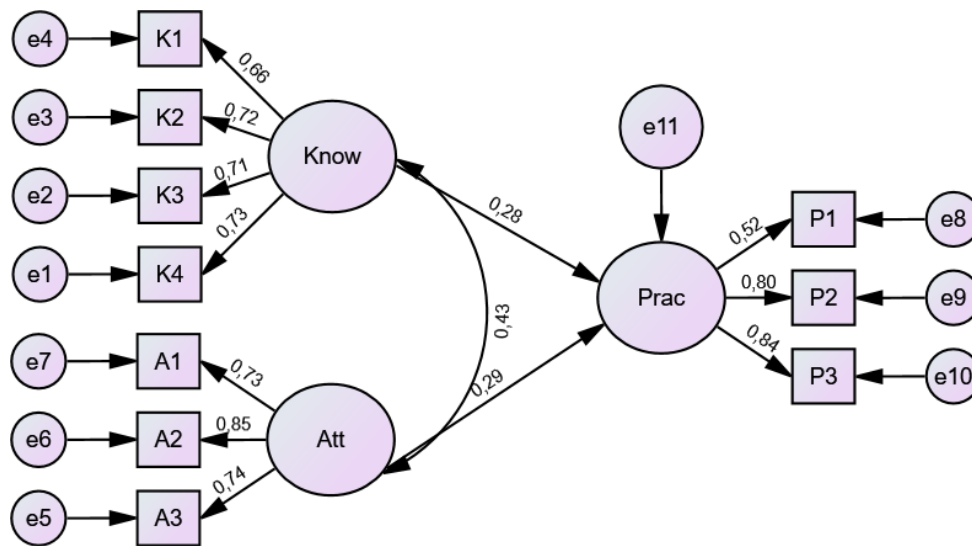


Figure 2. SEM mode

Note: $\chi^2 = 84.738$, $df = 32$, $p < 0.001$, $\chi^2 / df = 2.648$, CFI = 0.943, IFI = 0.944, GFI=0.944, TLI=0.920, RMSEA = 0.079

Factors predicting the perception of Healthcare Professionals at Bheki Mlangeni District Hospital, Gauteng Province South Africa, regarding Climate Change is given in Table 5. Hypothesis 1 investigates the relationship between knowledge of climate change (IV) and practice (DV). The standardized coefficient (β) of 0.277 indicates a positive relationship, meaning that as knowledge of climate change increases, practice also tends to improve. This effect was significant leading to the acceptance of the hypothesis. Therefore, there is significant evidence to conclude that knowledge of climate change positively impacts practice.

Table 5. Path estimates and hypothesis testing

Hypotheses	Dependent variable (DV)		Independent Variable (IV)	Standardized coefficient β	S.E.	Critical P Ratio. (CR)	P	Decision
H1	Perception	<---	Knowledge of climate change	,277	,051	3,155	,002	Accepted
H2	Perception	<---	Attitude towards climate change	,287	,043	3,314	***	Accepted

Hypothesis 2 examines the relationship between attitude towards climate change (IV) and perception (DV). The standardized coefficient (β) of 0.287 signifies a positive relationship, indicating that a more favourable attitude towards climate change is associated with better practice. This leads to the acceptance of the hypothesis. Therefore, it can be concluded that a positive attitude towards climate change significantly enhances practice. Overall, both hypotheses (H1 and H2) are accepted, indicating that both knowledge of climate change and attitude towards climate change positively and significantly influence perception. The standardized coefficients show that attitude towards climate change has a slightly stronger influence on perception than knowledge of climate change, but both variables are important predictors of perception related to climate change.

Discussion

Climate change, recognized by the World Health Organization (WHO) as the most significant health threat of the 21st century. The healthcare sector significantly contributes to climate change through waste, energy consumption, and transportation (Kreslake et al., 2018). The purpose of the study was to explore the knowledge, attitudes, and perceptions of healthcare professionals toward climate change in South Africa. Data was drawn from 385 healthcare workers with a response rate of 68.6% (n=264). The finding reveals diverse sources through which respondents have gained awareness of climate change, particularly television. The prominence of television (30.6%) as the primary source aligns with prior research indicating that visual media is a powerful tool for disseminating information about environmental issues. Research suggests that television coverage of climate change plays a critical role in shaping public perception, often emphasizing extreme weather events and scientific debates to attract viewership (Schmidt et al., 2013). This perhaps could have positively influenced the knowledge of climate change among the healthcare workers surveyed (Table 2). Television combines audio-visual elements that can enhance comprehension and retention of climate-related messages (Boykoff & Roberts, 2007).

Following television, radio was identified as the second most prevalent source (20.1%). This finding corresponds with studies indicating that radio remains a vital channel for information dissemination, particularly in communities where access to television or the internet may be limited (Ajisafe, 2021). Radio's ability to reach diverse audiences, including rural populations, makes it an effective medium for spreading climate awareness (Lee et al., 2015). The role of education in climate change awareness is underscored by 14.2% of respondents citing school as a source. Schools serve as critical platforms for instilling environmental knowledge and fostering climate literacy from an early age (Monroe et al., 2019). This is consistent with research advocating for climate change education as a means to empower future generations with the knowledge and skills to address environmental challenges (Kagawa & Selby, 2010). Other sources of climate change reported including friends, relatives, social media, and newspapers. The finding suggests these also contribute to respondents' awareness, reflecting the multi-dimensional nature of information dissemination. Social media, in particular, has emerged as a powerful platform for climate communication, enabling rapid information exchange and public engagement (Williams et al., 2015). However, concerns over misinformation and the quality of climate-related content on social platforms may highlight the need for media literacy initiatives (Van der Linden et al., 2017).

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for the spread of misinformation. Recent studies have highlighted the growing challenge of climate-related misinformation on digital platforms, which can undermine evidence-based understanding and foster uncertainty (Treen et al., 2020; Zhou & Shen, 2022). As documented in the literature, social media and echo chambers accelerate the spread of misinformation, reinforcing existing biases and further hindering constructive behavioural responses (Treen et al., 2020; Chu et al., 2023). The findings of this study point to the need for targeted interventions that build media literacy among healthcare professionals, enabling them to critically evaluate and navigate information from both traditional and digital sources.

The theoretical contribution of the study lies in its application of Theory of Planned Behaviour (TPB) in understanding health care professionals' knowledge, attitudes and perceptions towards climate change. The model explained 68.24% of the variance. The findings revealed that both knowledge and attitudes towards climate change significantly influence the perception of healthcare professionals. The path from knowledge to perception is positive and significant ($\beta = 0.277$; $p = 0.002$), indicating that as healthcare professionals' knowledge of climate change increases, their engagement in climate change-related perceptions also increases, and vice versa. The findings support theoretical propositions that increasing knowledge about climate change can lead to positive changes in attitudes and behaviours (Steg & Vlek, 2009). This may likely be attributed to the fact that individuals with greater knowledge of climate change were more likely to perceive it as a serious threat and express greater concern about its impacts (Leiserowitz & Smith, 2017). The results of this study are consistent with the findings of Manga et al. (2022) regarding a South African study among healthcare professionals. This study showed that most of the healthcare professionals agreed on the adverse effects of climate change on public health. A similar observation made in a study conducted by Kotcher et al. (2021) affirms the healthcare professionals' robust knowledge regarding the impact of climate change on health.

The significant impact of attitudes on perception (H2) suggests that fostering positive attitudes towards climate change among healthcare professionals can enhance their engagement in mitigation efforts ($\beta = 0.287$; $p < 0.001$). The strong influence of attitudes found in this study supports the notion that healthcare professionals' beliefs about the importance of addressing climate change can drive their actions. The study by Leiserowitz and Smith (2017) highlights that individuals with more profound understandings and concerns about climate change are more likely to perceive it as a significant threat and act accordingly. Healthcare professionals who witness the direct impacts of climate change on patients' health or observe sustainable practices such as water conservation, telemedicine, medical waste management as well as responsible medical waste disposal implemented within their healthcare settings may develop more favourable attitudes toward climate action and environmental stewardship. In a multinational survey conducted in 2021, it was reported that 95% of healthcare workers believed in climate change (Kotcher et al., 2021). Similarly, study by Manga et al. (2022), revealed that 97% of healthcare professionals shared this belief, aligning with our own study's results, where an overwhelming majority ($M=4.22$) concurred that climate change is indeed a reality (P1).

The dominance of traditional media sources, particularly television and radio, as primary information channels suggests that these platforms continue to play an influential role in shaping healthcare professionals' climate-related knowledge. However, this reliance on traditional media also highlights a vulnerability, as professionals may be less attuned to misinformation that circulates on digital platforms, where much of the public discourse about climate change now occurs (Bloomfield & Tillery, 2019; Vivion et al., 2024; Bloomfield et al., 2025). More importantly, the findings reveal a persistent gap between awareness and action. Although healthcare professionals in this study expressed high levels of awareness and generally positive attitudes towards climate change, translating these into concrete mitigation behaviours remains a challenge. This underscores the need for healthcare institutions to go beyond raising awareness by creating supportive environments that enable and incentivize climate action. This could include embedding sustainability into institutional policies, providing practical tools for implementing eco-friendly practices, and training healthcare professionals to communicate effectively about climate-health issues with patients and communities. Furthermore, while the study findings affirm the theoretical pathways proposed by the TPB, they offer limited novelty, as they primarily confirm relationships that have been well documented in previous research. More critically, the study did not sufficiently interrogate the influence of climate change misinformation on knowledge, attitudes, or perceptions within the healthcare setting. Given the rising prevalence of misinformation, particularly on digital platforms, this omission represents a missed opportunity to advance understanding of how misinformation may distort healthcare professionals' views or impede climate action. To strengthen the theoretical contribution, future research could integrate frameworks from communication science and misinformation studies. For example, Inoculation Theory

(Cook et al., 2017) offers insights into how exposure to weakened forms of misinformation or pre-emptive refutations could help healthcare professionals build resistance to misleading claims.

Conclusions

This study has provided valuable insights into the knowledge, attitudes, and perceptions of healthcare professionals at Bheki Mlangeni District Hospital in Gauteng Province, South Africa, regarding climate change. The findings reveal that a significant portion of individuals became aware of climate change through television broadcasts, emphasizing the influential role of visual media in disseminating information. Furthermore, the study found that both knowledge and attitudes are essential in shaping the perceptions and practices of healthcare professionals regarding climate change. The slightly stronger influence of attitudes on practices suggests that efforts to foster positive attitudes towards climate change could be particularly effective in promoting environmentally responsible behaviours within the healthcare sector. The findings have significant implications for policy and practice, suggesting that healthcare institutions should prioritize climate change education and foster an environment that supports and encourages pro-environmental practices. By doing so, healthcare professionals can be better equipped to lead and advocate for climate change mitigation efforts, leveraging their trusted status to influence broader societal change. Consequently, future studies should explore the potential for interdisciplinary approaches to address the health impacts of climate change.

Declarations

Interdisciplinary Scope: This study integrates public health, communication studies, environmental science, behavioural science, and African studies to examine how climate change influences the social determinants of health and shapes healthcare professionals' knowledge, attitudes, perceptions, and practices in a South African hospital context. It explores the intersection of climate change literacy, health systems strengthening, and environmental advocacy, highlighting how gaps in formal education and reliance on mass media shape awareness and response behaviours. By analysing healthcare workers' knowledge pathways and practice-related determinants, the research underscores the need for strengthened climate change education, evidence-informed health communication, and equitable climate-health policy frameworks to enhance mitigation efforts and protect vulnerable communities.

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