



Assessment of Knowledge, Attitudes and Practices Regarding Climate change and Its health Impact among Healthcare professional in Sana'a city hospitals – 2025.

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Abstract: This study aimed to assess the knowledge, attitudes, and practices (KAP) of healthcare professionals in Sana'a, Yemen, regarding climate change and its health impacts to inform public health strategies.

Methods: A cross-sectional study was conducted from January to March 2025 across eight public and private hospitals in Sana'a. A self-administered structured questionnaire was distributed to a sample of 354 healthcare professionals, including doctors and nurses.

Results: The study included 353 respondents, predominantly nurses (58.6%) and males (52.4%). Most participants (69.1%) were between 25 and 40 years old. Knowledge assessment showed that 50.7% had good knowledge of climate change, while 49.3% demonstrated poor understanding. Social media was the primary information source (79.5%). Although 70.3% expressed concern about climate change impacts, only 20.2% reported participating in awareness campaigns. Multivariable analysis revealed that professionals with less than five years of experience had significantly superior knowledge, and those in public hospitals had better awareness compared to their private counterparts. Furthermore, 65.8% believed climate change increases the burden on healthcare systems, yet only 28.6% were familiar with heat action plans.

Conclusions: While healthcare professionals in Sana'a demonstrate considerable awareness of climate change, a clear gap remains between knowledge and active practices. Enhanced educational interventions and engagement strategies are essential to bridge this gap and support proactive responses to climate-related health challenges.

Keywords: Climate change, health professionals, the knowledge, attitudes, practices.

تقييم المعرفة والمواقف والممارسات المتعلقة بتغير المناخ وأثره على الصحة بين العاملين في مجال الرعاية الصحية في مستشفيات مدينة صنعاء (2025)

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تاريخ التسليم: 2026/01/12، تاريخ القبول: 2026/02/20، تاريخ النشر: 2026/04/01.

الملخص: اليمن من بين الدول الأكثر تضرراً من تغير المناخ، مما يُفاقم التحديات الصحية والاجتماعية والبيئية القائمة. يزيد تغير المناخ من انتشار الأمراض المنقولة بالمياه والنواقل، ويُفاقم الأمراض المزمنة، مما يُشكل ضغطاً كبيراً على نظام الرعاية الصحية الهش في اليمن. الهدف: هدفت هذه الدراسة إلى تقييم معارف ومواقف وممارسات العاملين في مجال الرعاية الصحية في صنعاء، اليمن، فيما يتعلق بتغير المناخ وآثاره الصحية، وذلك لتوجيه استراتيجيات الصحة العامة. المنهجية: أُجريت دراسة مقطعية من يناير إلى مارس 2025 في ثمانية مستشفيات عامة وخاصة في صنعاء. وُزِعَ استبيان مُهيكل ذاتي الإدارة على عينة من 354 من العاملين في مجال الرعاية الصحية، بما في ذلك الأطباء والممرضات. النتائج: شملت الدراسة 353 مُستجيباً، معظمهم من الممرضين (58.6%) والذكور (52.4%). تراوحت أعمار معظم المشاركين (69.1%) بين 25 و 40 عاماً. أظهر تقييم المعرفة أن 50.7% لديهم معرفة جيدة بتغير المناخ، بينما أظهر 49.3% ضعف فهمهم. وكانت وسائل التواصل الاجتماعي المصدر الرئيسي للمعلومات (79.5%). وعلى الرغم من أن 70.3% أعربوا عن قلقهم بشأن آثار تغير المناخ، إلا أن 20.2% فقط أفادوا بمشاركتهم في حملات التوعية. وكشف التحليل متعدد المتغيرات أن المهنيين الذين تقل خبرتهم عن خمس سنوات لديهم معرفة متفوقة بشكل ملحوظ، وأن العاملين في المستشفيات العامة لديهم وعي أفضل مقارنة بنظرائهم في القطاع الخاص. علاوة على ذلك، يعتقد 65.8% أن تغير المناخ يزيد العبء على أنظمة الرعاية الصحية، ومع ذلك فإن 28.6% فقط كانوا على دراية بخطط العمل المتعلقة بالحرارة. في حين أن المهنيين في مجال الرعاية الصحية في صنعاء يُظهرون وعياً كبيراً بتغير المناخ، إلا أنه لا تزال هناك فجوة واضحة بين المعرفة والممارسات الفعالة. وتُعد التدخلات التعليمية المُحسَّنة واستراتيجيات المشاركة ضرورية لسد هذه الفجوة ودعم الاستجابات الاستباقية للتحديات الصحية المتعلقة بالمناخ.

الكلمات المفتاحية: التغيرات المناخية، العمال الصحيين، المعارف، الاتجاهات، الممارسات

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Introduction

Climate change (CC), refers to the ongoing alterations in the climate system across time and regions, primarily driven by human activities mainly with a minor contribution from natural processes. It is a complex environmental hazard that has a worldwide effect on public health, development, agriculture, water supplies, and energy production. (Sulistyawati et al 2018).

Greenhouse gases (GHGs) are the most significant drivers of CC. GHGs concentrations have substantially increased in recent decades. They include carbon dioxide (CO₂), the most contributed gas, as well as methane, nitrous oxide, and chlorofluorocarbons (CFCs) (Gazzaz and Aldeseet 2021). Currently, the main sources of GHGs are energy production,

consequence, sea levels are rising, glaciers are melting, weather-related natural disasters are becoming more frequent and precipitation patterns are changing. Climate change has profound impacts on human health, including reduced air quality, compromised food safety, increased waterborne diseases, and heightened morbidity and mortality due to extreme temperatures. Additionally, it has led to the emergence of new infectious diseases and adverse mental health outcomes, such as anxiety and depression (Melillo et al., 2014; Berry et al., 2010). Moreover, Climate change affects the social and environmental determinants of health, clean air, safe drinking water, sufficient food and secure shelter. Between 2030 and 2050, climate change is expected to cause approximately 250000 additional deaths per year, from malnutrition, malaria, diarrhea and heat stress. The direct damage costs to health (i.e. excluding costs in health determining sectors such as agriculture and water and sanitation), is estimated to be between USD 2-4 billion/year by 2030. Areas with weak health infrastructure – mostly in developing countries will be the least able to cope without assistance to prepare and respond (WHO2002).

The health impacts of climate change are already evident globally. According to the World Health Organization (WHO), recent climate shifts have resulted in the loss of approximately 150,000 lives and 5 million Disability-Adjusted Life Years (DALYs) worldwide. The accelerating pace of demographic, social, economic, and ecological changes, compounded by globalization, has intensified these impacts, particularly in developing countries unable to adapt effectively (WHO2002). In Egypt, climate change poses a severe threat due to its geographic location and high population density. For example, a heatwave in 2018 resulted in 65 deaths within three days (A Ibrahim A, et al2018).

In Yemen, the impacts of climate change are particularly devastating. Shifts in temperature and rainfall patterns have facilitated the spread of infectious diseases like malaria, dengue fever, and cholera. Flooding and water shortages have further increased the prevalence of waterborne diseases. For instance, Yemen

transportation, food production, housing, industry, agricultural activities, and waste management (Marí-Dell’Olmo 2022). The change in the climate system was first noticed through some signs known as global warming. During this century, the Earth’s temperature has warmed by approximately 0.5 °C, which is predicted to rise to 3 °C by 2030. This phenomenon is associated with widespread changes in weather patterns and a subsequent rise in sea surface temperatures and sea levels, which can lead to property damage and loss of life, especially in coastal communities (Park, 2021) Furthermore, climate change is undermining many of the social determinants for good health, such as livelihoods, equality and access to healthcare and social support structures. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged, including women, children, ethnic minorities, poor communities, migrants or displaced persons, older populations, and those with underlying health conditions (WHO2023). In 2009, the first Lancet Commission for Global Health identified Climate Change (CC) as “the biggest global health threat of the 21st century. (Costello et al., 2009). Farther more, the 2015 Lancet Commission on Health and Climate Change, which concluded that anthropogenic climate change threatens to undermine the past 50 years of gains in public health, and conversely, that a comprehensive response to climate change could be “the greatest global health opportunity of the 21st century (Watts N, et al 2015). The World Meteorological Organization registered that the global mean surface temperature in 2018 was about 1.0 °C higher than pre-industrial levels (1850-1900). (World meteorological organization 2021). Seventeen out of the 18 warmest years in the 136-year record conducted by NASA have all occurred since 2001, except for 1998. (. Raey ME, et al 2020). This observed pattern of warming is known to be related to anthropogenic activity, and particularly to the use of fossil fuels. That is observed pattern of warming is known to be related to anthropogenic activity, and particularly to the use of fossil fuels. That is correlated to the increase of GHGs, mainly (CO₂). As

and dengue fever, extending their reach into previously unaffected areas.

Additionally, chronic diseases such as cardiovascular, respiratory, and renal conditions are likely to worsen due to the compounding effects of rising temperatures, air pollution, and extreme weather events. As climate conditions continue to deteriorate, more frequent and severe weather-related events—such as storms, floods, droughts, and extreme heatwaves—are predicted. These events directly and indirectly affect health by increasing mortality, spreading infectious diseases, and contributing to health emergencies.

The healthcare workforce and infrastructure in Yemen are also under significant strain. Climate shocks and stressors, such as changing precipitation patterns, rising sea levels, and natural disasters, weaken the environmental and social determinants of health, including access to clean air, water, and food. These challenges reduce the healthcare system's capacity to provide universal health coverage (UHC) and undermine decades of progress in global health. Despite the evident risks, there is a lack of research in Yemen assessing healthcare workers' knowledge, attitudes, and practices regarding climate change and its health impacts. Understanding the awareness and preparedness of the healthcare workforce is essential for developing targeted interventions and integrating climate resilience into health sector planning. This study aims to address this critical gap and provide evidence-based recommendations to inform policies and strategies for mitigating the health impacts of climate change in Yemen. Objectives of the study.

General objective

To assess knowledge, attitude and practice regarding climate change and its health impact among healthcare professionals in Sana'a city hospitals

Specific Objectives

The study is intended to achieve the following special objectives.

1. To determine the sources of information of healthcare professionals regarding knowledge about climate change and its health impact.

experienced a catastrophic cholera outbreak beginning in 2016, which reached its peak in 2017 with over 2,000 deaths reported it is called the biggest outbreak recorded. By November 2021, the outbreak had resulted in more than 2.5 million cases and over 4,000 deaths, marking it as one of the worst humanitarian crises in recent history (Federspiel and Ali, 2018).

Yemen's population faces heightened vulnerability to climate-induced health risks. An estimated 18.8 million people live in malaria-prone areas, generating approximately one million cases annually. Extreme weather events, such as storms and floods, have caused displacement, injuries, and significant economic losses. For example, a 2008 storm displaced 20,000 people, caused 180 fatalities, and resulted in damages worth USD 1.6 billion (USAID, 2016). Droughts and floods also exacerbate malnutrition and the spread of vector- and waterborne diseases. (YFCA2023). As the country grapples with food and water insecurity, vulnerable groups, including children and the elderly, are at greater risk of climate-related health issues. Extreme heat, for instance, disproportionately affects older individuals and those with pre-existing conditions like heart disease and diabetes (Singh NN, et al 2019). Moreover, Yemen's prolonged conflict has devastated its healthcare system, leaving only 51% of health facilities operational. As of 2022, 21.9 million Yemenis required support to access essential health services, with over eight million needing lifesaving nutritional assistance (World Bank, 2022).

Problem Statement

Yemen is one of the countries most vulnerable to climate change, with far-reaching environmental, social, and health consequences. Its fragile healthcare system and significant poverty alleviation challenges amplify the impacts of climate change. The country's public health indicators, such as high infant mortality, maternal morbidity, and under-five mortality rates, reflect an already precarious health situation. Climate change is expected to exacerbate these challenges by increasing the prevalence of vector-borne and waterborne diseases, such as malaria, cholera,

attitudes, and practices, this study will provide valuable insights for policymakers to design effective educational and training programs. These initiatives can enhance the health sector's flexibility and resilience, strengthen national strategies to address climate change, and ensure the continuity of healthcare services during emergencies.

Moreover, the study responds to Yemen's specific vulnerability to climate change, as highlighted by its ranking in the ND-GAIN Index as one of the most unprepared countries globally. With its already fragile health system, Yemen faces significant challenges in coping with the adverse effects of climate change, such as disease outbreaks, malnutrition, and displacement. This study will contribute to bridging the research gap by providing actionable data on healthcare workers' readiness to address these challenges, supporting the development of sustainable health policies, and aligning with global efforts to mitigate the health impacts of climate change.

Limitations of the study

This study has some limitations:

1. Geographical Delimitation

The study is conducted in hospitals located within Sana'a city. The geographical scope is limited to healthcare hospitals operating in Sana'a only and does not extend to hospitals or healthcare facilities in other regions.

2. Topical Delimitation

First, The study focuses on assessing the level of knowledge, practices, and attitudes of healthcare professionals regarding climate change and its health impacts. It does not address the environmental, economic, or political aspects of climate change. Second, the study employed a stratified convenience sampling method. While stratification helped ensure representation of certain groups, the use of a convenience sample may limit the generalizability of the results to all healthcare professionals, especially those who were harder to access. Third, the busy schedules of physicians and nurses during their shifts may have impacted their ability to respond to the questionnaire with full attention and accuracy. This could have affected the quality of the data

2.To identify the level of knowledge, attitude and practice regarding climate change and its health impact among healthcare professionals in Sana'a city hospitals attributable to demographic characters.

3.To identify the level of knowledge, attitude and practice regarding climate change and its health impact among healthcare professionals in Sana'a city hospitals according to their years of experience.

4.To identify the level of knowledge, practice and attitude regarding climate change and its health impact among healthcare professionals in Sana'a city hospitals according to their level of education.

5.To determine the preferred methods of receiving information among healthcare professionals regarding climate change and its health impact.

6.To explore the association between knowledge of healthcare professionals and their attitude.

7.To exam the relation between knowledge of healthcare professionals and their attitude.

Importance of the Study:

This study addresses a critical global and local need to raise awareness about the health impacts of climate change, particularly among healthcare professionals. The World Meteorological Organization's statement at the Madrid Conference emphasized the role of human activities in driving climate change and the need for societal behavior change to mitigate its effects (. Reimers FM 2021). Healthcare professionals, as credible sources of health information (Alduraywish SA,2020), are uniquely positioned to educate and guide communities in adapting to and minimizing the health risks associated with climate change.

Health professionals occupy a critical position in the response to climate change. First, they are charged with protecting individual and community health in the face of multiple new and compounding health risks that will become more complicated to address as time goes on (Dzau VJ, et al 2021) Second, the institutional knowledge of health professionals is indispensable in modifying health systems to become both resilient to climate threats and environmentally sustainable.(Dzau VJ, et al 2021) By understanding their knowledge,

healthcare professionals and students in relation to climate change and its health consequences. These studies, arranged in chronological order from the most recent to the oldest, offer valuable insights that help frame the context of the present research.

In a 2024 French multicenter cross-sectional study involving over 4,500 healthcare workers, participants expressed concern about the environmental impact of hospital operations and a willingness to engage in sustainability practices. However, several barriers were identified, including lack of time, insufficient institutional support, and limited access to training (Guihenneuc et al., 2024).

That same year, a descriptive survey conducted in India among 644 nursing students revealed that although a majority were knowledgeable about climate change, fewer than half perceived its health effects to be highly significant. The findings highlighted the need to integrate climate change more thoroughly into the nursing education curriculum (Ravi et al., 2024).

Another 2024 study conducted at Al-Azhar University for Girls in Cairo, Egypt, assessed climate change awareness among 768 undergraduate students. Most students were aware of climate change and its implications, but practical engagement in environmentally friendly behavior was limited. The study emphasized the importance of targeted education to translate awareness into action (Elsharkawy et al., 2024).

In the United States, the Minnesota Department of Health conducted a survey in 2022 to assess how well healthcare professionals understood climate change and its relevance to public health. Although most participants recognized climate change and its potential to harm patients' health, only a small percentage felt adequately prepared to address the issue in clinical practice (Kircher et al., 2022).

A similar cross-sectional study from India in 2022, involving over 3,000 healthcare workers, found high awareness of direct health effects such as heat-related illnesses and vector-borne diseases, but relatively limited understanding of less immediate effects such as malnutrition. The study underscored the urgent need to develop

collected, especially in terms of completeness and thoughtful reflection.

3. Human Delimitation

The target population consists of healthcare professionals working in Sana'a city hospitals, including physicians and nurses. Individuals outside the healthcare sector are not included in the study.

4. Temporal Delimitation

The timeframe of the study is limited to the year 2025, during which data collection and analysis were conducted. Therefore, the finding reflects the situation within this specific time period. Also, a cross-sectional design was used, meaning that data were collected at a single point in time. Therefore, it is not possible to determine causal relationships between the studied variables, nor to observe changes in knowledge, attitudes, or behaviors over time.

Study terms

Knowledge is a form of familiarity, awareness, understanding, or acquaintance. It often involves the possession of information learned through experience (Shepherd, N., 2023).

Attitude People's perceptions about the contamination, what they say about their intentions, understanding difficulties and obstacles to changing practices (Goutille, F., et al 2009)

Practice Real acts carried out by people in the situation, in their context (Goutille, F., et al 2009).

Climate change refers to long-term changes in temperature and weather patterns. While these changes can occur naturally, human activities—especially the burning of fossil fuels—have been the dominant cause since the 20th century, leading to increased greenhouse gas emissions and global warming (NASA, 2022).

Health care professionals are individuals who are qualified through education, training, and licensure to provide health care services to patients. This includes doctors, nurses, pharmacists, therapists, and other allied health workers who contribute to the diagnosis, treatment, and prevention of diseases and the promotion of health (WHO, 2023).

Previous Studies:

A growing body of research has examined the knowledge, attitudes, and practices of

- **Sampling:** Stratified random sampling (95% CI, Epi Info-calculated)
- **Tool:** Validated Arabic questionnaire with 5 sections:
 1. Demographics
 2. Knowledge (9-item, 3-point Likert: Yes/No/Not sure)
 3. Attitudes (13-item, 3-point Likert: High/Medium/Low)
 4. Practices (8-item, binary: Yes/No)
 5. Preferred information sources
- **Period:** January–March [2025]

Data Analysis

- **Software:** SPSS v25
- **Methods:**
 - Descriptive statistics (frequencies, means)
 - Chi-square tests (*p*-value) for associations

Ethical Considerations

- Approved by National Committee for Research Ethics
- Verbal informed consent, confidentiality ensured
- Pilot-tested at Modern German Hospital

Theoretical Framework

1. Definition of Climate Change

Climate change refers to long-term shifts in temperature, precipitation patterns, winds, and other aspects of Earth's climate system. According to the **Intergovernmental Panel on Climate Change (IPCC)**, it includes both natural and human-induced factors driving climatic shifts, particularly those observed since the mid-20th century. The **United Nations Framework Convention on Climate Change (UNFCCC)** defines it as climate alterations directly or indirectly linked to human activity, modifying atmospheric composition beyond natural variability.

2. Causes of Climate Change

- **Natural factors:** Volcanic eruptions, solar radiation variations, and ocean current shifts.
- **Anthropogenic factors:**
 - **Fossil fuel combustion** (coal, oil, gas) releasing greenhouse gases (CO₂, CH₄, N₂O).

climate-resilient healthcare systems (Sambath et al., 2022).

In Italy, a 2023 study conducted at Sapienza University examined the perceptions and knowledge of 364 students and health professionals. The findings indicated strong general awareness of climate change and its environmental and health implications, though knowledge levels varied by profession and geographic origin. The authors recommended enhanced public education campaigns tailored to regional differences (Torre et al., 2023).

Finally, a 2014 study from Ethiopia assessed the understanding of climate change among health sciences students at Haramaya University. While most participants acknowledged its relevance to public health, the vast majority admitted that their understanding was insufficient. The study concluded that academic programs should include more comprehensive content on climate and health (Nigatu et al., 2014).

Methodology: Study Design

- **Type:** Cross-sectional descriptive study
- **Variables:**
 - **Dependent:** Knowledge, attitudes, practices (KAP) regarding climate change health impacts
 - **Independent:** Healthcare professionals' demographics (profession, experience)

Setting & Population

- **Location:** 8 public and private hospitals in Sana'a city (ALThawra Modern general Hospital -Republican Teaching Hospital(AL Gumhori) - Kwait University Hospital- Al Sabeen Hospital for Maternity and Childhood- Abdulkader Al mutawakel Hospital – Azal Hospital - Modern European Hospital-University of Science and Technology Hospital).
- **Participants:** 354 healthcare professionals (137 doctors, 227 nurses) meeting inclusion criteria:
 - **Doctors:** MBBS, BDS, MD/MS
 - **Nurses:** GNM, ANM, ICU nurses, nursing officers

Sampling & Data Collection

Key References: IPCC (2014), UNFCCC (1992), WHO (2021), YFCA (2023).

RESULTS

Overview

This chapter presents the empirical findings derived from data collected among the study sample (n=353). Specifically, it examines the knowledge, attitudes, and practices regarding climate change and its health impacts among healthcare workers in Sana'a Capital City during 2025. The following sections provide a detailed analysis of the collected data, beginning with demographic characteristics before proceeding to thematic findings.

Demographic Characteristics

As presented in demographic variables reveals several key patterns. The hospital distribution shows that Al-Thawra Hospital contributed the largest proportion of participants (n=110, 31.2%), followed by Republican Hospital (n=76, 21.5%), Al-Sabeen Hospital (n=54, 15.3%), and Kuwait Hospital (n=50, 14.2%). The remaining participants were distributed among Azal Hospital (n=13, 3.7%), University of Science Hospital (n=34, 9.6%), and Al-Mutawakel Hospital (n=10, 2.8%).

Regarding institutional classification, public hospitals accounted for the majority of cases (n=289, 81.9%), while private hospitals constituted a smaller proportion (n=64, 18.1%). This distribution reflects the predominant role of public healthcare facilities in Yemen's capital.

The professional composition of respondents comprised physicians (n=141, 39.9%), nurses (n=207, 58.6%), and other healthcare workers (n=5, 1.4%). In terms of gender distribution, male participants slightly outnumbered females (185 vs. 168, representing 52.4% and 47.6% respectively).

Age distribution followed expected patterns for healthcare professionals, with the majority falling within the 25-40 years range (n=244, 69.1%). Subsequent age groups showed progressively smaller proportions: 18-24 years (n=86, 24.4%), 41-54 years (n=19, 5.4%), and 55-70 years (n=4, 1.1%).

Educational attainment among participants was distributed as follows: diploma holders (n=146, 41.4%), bachelor's degree (n=133, 37.7%),

- **Deforestation**, reducing carbon sequestration and releasing stored CO₂.
- **Agriculture**: Livestock (methane emissions) and nitrogen-based fertilizers (N₂O release).

3. Health Impacts of Climate Change

- **Expanded disease spread**: Malaria, dengue, and Lyme disease due to shifting weather patterns.
- **Worsened air quality**: Increased respiratory/cardiovascular diseases from ozone and particulate matter.
- **Food insecurity**: Malnutrition from droughts and crop failures.
- **Mental health effects**: Anxiety, depression, and PTSD linked to climate-related disasters.

4. Climate Change Effects in Yemen

- **Climate hazards**: Intensified droughts, floods, cyclones, and sea-level rise.
- **Water scarcity**: Rapid groundwater depletion (3–8 meters/year) and saltwater intrusion.
- **Agricultural collapse**: Arable land dropped from 1.6M to 1.2M hectares (2010–2020).
- **Health crises**: Cholera, malaria, and dengue outbreaks due to contaminated water and extreme weather.
- **Vulnerable groups**: Women, children, and displaced populations face disproportionate risks.

5. Healthcare Workers' Role

- **Advocacy & education**: Raise awareness on climate-health links.
- **Clinical adaptation**: Diagnose/treat climate-sensitive diseases (e.g., heatstroke, vector-borne infections).
- **Interdisciplinary collaboration**: Strengthen health system resilience.
- **Training**: Integrate climate health into medical curricula.

Conclusion

Climate change is a multidimensional threat to public health, especially in vulnerable nations like Yemen. Addressing it requires integrated adaptation/mitigation strategies, with healthcare professionals playing a pivotal role in leadership, education, and response.

demographic composition between the genders in the studied community.

However, the small difference between the two proportions (4.8%) does not indicate a clear dominance of one gender over the other. This relative balance may reflect the characteristics of the target community or the method of sample selection, thereby reducing the likelihood of significant gender bias in the data.

Educational level

The results presented in Figure 3 reveal a clear variation in educational attainment among the study participants. Diploma holders constituted the largest proportion at 41.4% (n=146), followed by those with a bachelor's degree at 37.7% (n=133). This distribution indicates a predominance of mid-level qualifications (diplomas and bachelor's degrees) within the sample.

Conversely, higher education degrees were significantly less common. Only 6.8% (n=24) held a master's degree, while 11% (n=39) had a PhD. Although these percentages are modest compared to lower educational levels, they suggest a reasonable representation of advanced education in the sample.

Regarding the "Other" category (3.1%, n=11), this group may hold significance if it represents non-standard or lower educational attainment. Overall, the sample exhibits educational diversity, with a pronounced emphasis on mid-level qualifications, potentially reflecting the characteristics of the studied population or the study's specific requirements

master's degree (n=24, 6.8%), PhD (n=39, 11.0%), and other qualifications (n=11, 3.1%). Finally, professional experience data revealed that most participants had less than 5 years of experience (n=198, 56.1%), followed by 5-10 years (n=72, 20.4%), 15+ years (n=64, 18.1%), and 11-14 years (n=19, 5.4%). This distribution suggests a relatively young workforce composition in Sana'a's healthcare sector.

Age Groups

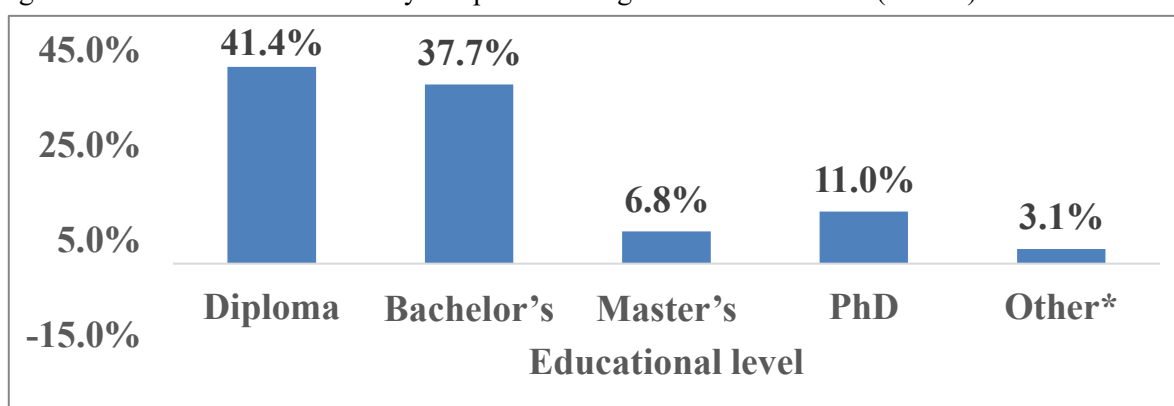
The data in Figure 4.1 shows an uneven distribution of age groups in the studied sample. The age group of 25 to 40 years constitutes the largest proportion, accounting for 69.1% (244 individuals), indicating the dominance of this group in the demographic composition of the sample. In contrast, the age group of 18 to 24 years represented 24.4% (86 individuals), which is significantly lower compared to the previous group, but it remains the second most important group.

As for the two older age groups, their proportions were very minimal. The age group of 41 to 54 years represented only 5.4% (19 individuals), while the proportion of individuals aged 55 to 70 years did not exceed 1.1% (4 individuals).

Gender Variable

The results in Figure 4.2 indicate a relative balance in the distribution of the sample between genders, with males representing 52.4% (185 individuals) and females representing 47.6% (168 individuals). This distribution shows a slight difference in favor of males, which may reflect a closely aligned

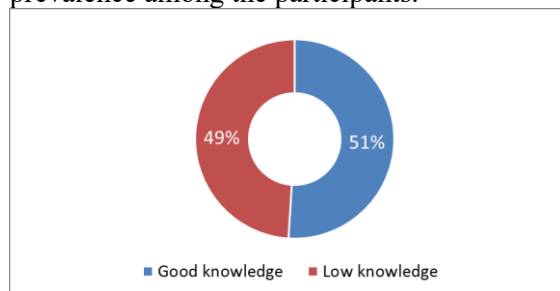
Figure 0.1: Distribution of the study sample according to educational level (N=353)



majority of respondents (56.1%) have less than five years of experience, suggesting a predominance of recent medical graduates in the sample. This distribution likely reflects the

The results indicate a marked disparity in the distribution of professional experience among the study participants. The data reveal that the

the characteristics of the assessment tool used in the evaluation. Additionally, this pattern may reflect the inherent characteristics of the studied phenomenon and its relatively even prevalence among the participants.



The provided data illustrate the knowledge levels of participants (n=353) regarding climate change and its impacts. Their responses were analyzed across multiple items pertaining to awareness, sources of information, and general understanding of climate change.

Awareness of Climate Change

Regarding the question, "Have you heard of the term 'climate change'?", 96.7% (n=322) reported familiarity with the concept, indicating a high level of awareness on this issue. However, further analysis reveals that the primary sources of knowledge were not traditional media outlets such as newspapers and radio, as might be expected. Instead, social media emerged as the dominant source, cited by 79.5% (n=237), whereas newspapers were referenced by only 29.2% (n=74). This finding underscores a shift in information consumption patterns concerning environmental topics.

Perceptions of Climate Change Effects

Concerning observed climatic variations, 74.9% (n=250) reported an increase in heatwaves, while 78.1% (n=264) noted a rise in cold waves. These statistics reflect public recognition of shifting climate patterns and their growing impacts.

Understanding of Climate Change Causes

When participants were asked about potential causes of climate change, 68.2% (n=230) identified fossil fuel combustion as a major contributor, demonstrating a sound understanding of anthropogenic drivers. Notably, a significant majority (85.2%) also attributed climate change to "the will of God ()", highlighting the influence of cultural and religious beliefs in shaping environmental interpretations.

Health Impacts of Climate Change

current reality of Yemen's healthcare system, which is experiencing a surge of new graduates entering the medical field.

In contrast, those with moderate experience (5–10 years) account for 20.4% of the sample, while the most experienced group (15+ years) represents 18.1%. Notably, professionals with 11–14 years of experience constitute the smallest proportion (5.4%), potentially indicating a recruitment gap or workforce retention issues during that period.

Knowledge Level Among Study Participants

The data indicate a closely clustered distribution of knowledge levels among the study sample, with remarkably similar proportions across all three categories. Specifically, participants classified as having "low knowledge" accounted for 34.1% (n=43), while those with "moderate knowledge" represented 33.3% (n=42), and the "high knowledge" group comprised 32.5% (n=41).

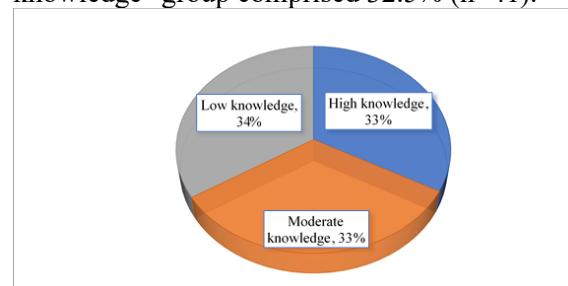


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Knowledge Level of the Study Sample (Dichotomous Categories)

The results presented 6 indicate a near-complete balance in the distribution of knowledge levels among the study participants. Specifically, 50.7%

(n=179) demonstrated good knowledge, while 49.3% (n=174) exhibited poor knowledge. This distribution reflects a noticeable parity between the two knowledge levels, with only a slight predominance of the good knowledge category.

Notably, the difference between the two proportions does not exceed 1.4%, suggesting a relative equivalence in knowledge levels within the studied population. Consequently, it can be inferred that the sample exhibits a remarkable cognitive balance, with no clear dominance of either knowledge level.

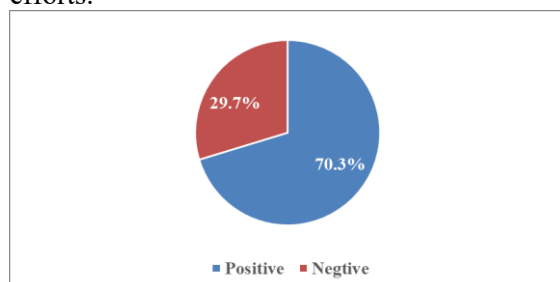
In this context, this equilibrium in knowledge distribution may be attributed to several factors, including the nature of the target population or

Regarding the role of health professionals, the results also highlight high interest, with 141 individuals (40.9%) in the high category, 142 individuals (41.2%) in the moderate category, and 62 individuals (18.0%) in the low category. For practical aspects such as prioritizing environmental health and replacing harmful chemicals, 179 individuals (52.8%) showed high interest in the former, and 158 individuals (46.1%) in the latter, while the results of several other considerations, such as implementing energy efficiency and designing green hospitals, also remained at the same high level of interest.

In conclusion, the results indicate that the average level of interest among individuals in all trends is 2.19, with an overall interest rate of 72.8%, suggesting that attitudes and positions toward climate change are generally high. Table 6 shows the level of their trends and attitudes towards climate change for the study sample (N=353)

The findings reveal a significant inclination towards positive attitudes regarding climate change among the study sample. Specifically, 70.3% of participants expressed a positive outlook, indicating an awareness and acknowledgment of the importance of addressing climate change. This predominant positive sentiment suggests that a majority of individuals recognize the urgency of climate action and potentially support initiatives aimed at mitigating its impacts.

Conversely, 29.7% of the respondents reported negative attitudes towards climate change. This minority perspective may stem from various factors, including skepticism about climate science, lack of awareness regarding the consequences of climate change, or a perceived inability to effect change. Understanding this segment of the population is crucial, as their attitudes could hinder progress in climate action efforts.



In terms of perceived health effects, 74.7% (n=257) associated climate change with a rise in air quality-related illnesses. However, only 60.7% (n=201) recognized an increase in heat-related diseases, suggesting a gap in awareness that may warrant further public health education.

Role of the Healthcare Sector

Regarding the healthcare system's role in addressing climate change, 65.8% (n=223) believed that climate change increases the burden on healthcare workers. These findings indicate a growing recognition of climate-related health risks, emphasizing the need for proactive measures by health professionals to mitigate these effects.

Awareness of Mitigation Strategies

Knowledge of specific climate adaptation strategies varied considerably. For instance, only 28.6% (n=96) were aware of heat action plans, while awareness of the Water, Sanitation, and Hygiene (WASH) program was higher at 51.9% (n=180).

The results of the study, which included a sample of 353 individuals, indicate a high level of concern regarding the effects of climate change. It was found that 138 individuals (39.8%) are highly interested in learning more about the effects of climate change on health, while 155 individuals (44.7%) show moderate interest, and 0% express low interest.

Regarding the effects of climate change on health infrastructure, 70 individuals (20.2%) showed high interest, while 277 individuals (79.8%) had moderate interest, and 0% were less interested.

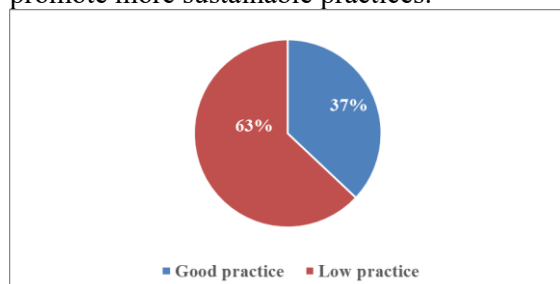
In terms of the government's role, 85 individuals (25.0%) expressed high interest, 125 individuals (36.8%) moderate interest, and 130 individuals (38.2%) low interest. Interest in the role of non-governmental organizations was similar, with 93 individuals (28.0%) showing high interest, 120 individuals (36.1%) moderate interest, and 119 individuals (35.8%) low interest.

When considering the relationship between the spread of infectious diseases and climate change, 152 individuals (44.2%) showed high interest, compared to 116 individuals (33.7%) who had moderate interest and 76 individuals (22.1%) who had low interest.

taking steps to reduce energy usage, while 79.5% (271 individuals) are not. In terms of recycling, 24.9% of the sample (85 individuals) engage in this practice, while 75.1% (256 individuals) do not contribute to recycling. For eco-friendly transportation, 20.8% (71 individuals) adopt this mode, while 79.2% (270 individuals) do not. Finally, 51.3% (175 individuals) participate in climate change awareness and education activities, whereas 48.7% (166 individuals) do not.

These results indicate that a segment of individuals is positively contributing to actions that mitigate the impacts of climate change, particularly in terms of awareness and education. Nonetheless, there remains significant room for improvement in practices such as reducing energy consumption and utilizing eco-friendly transportation and recycling. This gap highlights the need for enhanced awareness and encouragement to implement these strategies in workplaces.

In conclusion, the findings suggest that participants in the study possess a good level of awareness regarding climate change; however, there exists a gap between awareness and practice, necessitating greater commitment to actionable measures. It is clear that enhancing individual engagement in awareness campaigns and research activities is essential. Furthermore, improving strategies for energy reduction and the effective use of eco-friendly transportation is increasingly demanded, indicating a need for comprehensive educational programs and awareness campaigns in the community to promote more sustainable practices.



Do you take any measures to mitigate the effects of climate change in your workplace? If yes, what measures? (You may select multiple answers from the following options)"

The results regarding individuals' preferences for receiving information highlight several important aspects. When participants were asked about their preferred format for receiving information, the responses were as follows: brochures (70, 20.5%), posters (75, 22.0%), reports (54, 15.8%), and scientific articles (142,

Focusing on practices related to the impacts of climate change on public health and engagement in awareness activities. The data indicates a good awareness of this issue; however, there is a disparity in the levels of practice. Specifically, 161 individuals (46.0%) reported discussing the health impacts of climate change, while 189 individuals (54.0%) did not engage in such discussions. With a mean score of 1.54, this suggests a "good" practice level of 77.0%, indicating general awareness but a need to enhance dialogue regarding the effects of climate change.

In terms of participation in climate change awareness campaigns, only 70 individuals (20.2%) reported involvement, whereas 277 individuals (79.8%) did not participate. The mean score of 1.80 reflects a "good" practice level of 89.9%, highlighting the necessity for increased participation in seminars and awareness campaigns. Additionally, 56 individuals (16.2%) expressed interest in conducting research on the topic, while 289 individuals (83.8%) did not. The mean score of 1.84 indicates a "good" practice level of 91.9%, underscoring a substantial opportunity to support further research in this field.

Regarding participation in air pollution awareness campaigns, 86 individuals (24.9%) expressed interest, while 260 individuals (75.1%) did not participate. The mean score of 1.75 indicates a "good" practice level of 87.6%. In terms of actions taken to reduce the impacts of climate change in the workplace, 136 individuals (41.6%) reported taking steps, while 191 individuals (58.4%) did not. With a mean score of 1.58, this reflects a "good" practice level of 79.2%.

When examining specific actions taken, the data reveals that 149 individuals (51.9%) are reducing energy usage, with a mean score of 1.48 indicating a "weak" practice level of 74.0%. Meanwhile, 124 individuals (43.8%) engage in recycling, with a mean score of 1.56 suggesting a "good" practice level of 78.1%. Regarding the use of eco-friendly transportation, 135 individuals (47.0%) showed interest, with a mean score of 1.53 indicating a "good" practice level of 76.5%. Concerning awareness and education, 196 individuals (64.7%) participate, with a mean score of 1.35 reflecting a "weak" practice level of 67.7%.

The data related to actions taken to mitigate climate change in the workplace indicates that 20.5% of participants (70 individuals) are

confirming age is not an influential factor in this sample.

The relationship Between Sample Participants' Attitudes and Perceptions Toward Climate Change and Demographic Variables

Analysis of Demographic Correlates with Climate Change Attitudes

The results examining the relationship between participants' attitudes toward climate change and demographic variables revealed several statistically significant associations:

1. Hospital Type: A significant relationship was observed ($p=0.011$), indicating that attitudes differed meaningfully between public and private hospital staff, with private hospital employees demonstrating more climate-positive orientations.
2. Occupation: The non-significant p-value ($p=0.326$) suggests occupational roles (physicians, nurses, etc.) did not significantly predict climate change knowledge levels.
3. Gender: A robust statistically significant association emerged ($p=0.000$), with male participants exhibiting stronger pro-climate attitudes than female counterparts.
4. Education Level: Significant effects were found ($p=0.028$), where advanced degree holders (Masters/PhD) demonstrated superior climate change awareness and more positive attitudes. Relationship between sample participants' climate change practices and demographic variables

Statistical Analysis of Demographic Correlates with Climate Practices

The analysis revealed significant findings regarding the statistical relationships between demographic variables and climate change mitigation practices:

1. Professional Experience: The non-significant p-value ($p=0.399$) indicates experience years (<5 years vs others) showed no meaningful association with practice quality, despite novices demonstrating proportionally more weak practices.
2. Age: Similarly, age groups showed no significant relationship ($p=0.570$),

41.6%). These data clearly demonstrate that scientific articles were the most preferred option at 41.6%, reflecting individuals' desire for accurate, in-depth information that comprehensively covers their topics of interest. Concerning language preferences, the results showed: Arabic (300, 86.2%) and English (48, 13.8%). The findings reveal a strong preference for Arabic, favored by 86.2% of participants, underscoring the crucial role of language and culture in information comprehension.

Regarding preferred information channels, the results were distributed as: newspapers (31, 8.9%), radio (29, 8.4%), social media (218, 62.8%), and training courses (69, 19.9%). Social media emerged as the most utilized channel at 62.8%, reflecting the growing trend toward reliance on modern technology for accessing information through interactive and rapid means.

The results examining the relationship between demographic variables and individuals' climate change knowledge (using p-values to determine statistical significance) revealed several key findings:

1. Occupation: The p-value of 0.578 indicates no statistically significant relationship between occupation type (doctor, nurse, etc.) and climate change knowledge level, suggesting observed differences may be coincidental.
2. Gender: With a p-value of 0.148, gender shows no significant association with knowledge levels, implying climate change understanding is not substantially influenced by sex.
3. Education level: The non-significant p-value of 0.261 demonstrates no statistically meaningful relationship between educational attainment and climate change knowledge.
4. Professional experience: A significant p-value of 0.018 emerged, revealing that individuals with less than five years of experience demonstrated superior climate change knowledge compared to their more experienced counterparts.
5. Age: The non-significant p-value of 0.495 reflects no meaningful relationship between age groups and climate change knowledge,

positive regression coefficient ($\beta = 0.914$), suggesting a meaningful educational influence.

Conversely, no statistically significant differences in knowledge were found between bachelor's, master's, or other degree holders compared to PhD holders ($p > 0.05$). This may reflect either similar environmental awareness across these groups or a plateau in the impact of higher education beyond a certain level.

Association Between Sample Participants' Attitudes Toward Climate Change and Demographic Variables Using Multivariate Regression Analysis

The multivariate regression analysis revealed statistically significant relationships between certain demographic variables and participants' attitudes toward climate change. Below is a detailed interpretation of the key findings:

1. Gender Differences in Attitudes:

A statistically significant association was observed between gender and climate change attitudes ($p = 0.019$). Female participants demonstrated more positive attitudes compared to males (reference group), with an adjusted odds ratio (aOR) of 1.822 (95% CI: 1.106-3.002).

This indicates that females were approximately 1.8 times more likely to exhibit positive environmental attitudes. The positive regression coefficient ($\beta = 0.600$) further supports this finding, demonstrating a moderate yet meaningful gender effect on climate change perceptions.

Educational Level and Climate Attitudes:

Educational level also played a significant role, particularly among diploma holders compared to PhD holders (reference group). The adjusted odds ratio for diploma holders was 2.801 (95% CI: 1.051-7.466; $p = 0.040$), indicating they were 2.8 times more likely to express greater concerns about climate change. The regression coefficient ($\beta = 1.030$) reinforces this relationship, suggesting a strong positive association.

However, no statistically significant differences were found between participants with bachelor's degrees, master's degrees, or other qualifications ($p > 0.05$). This suggests that higher education (beyond diploma level) is not necessarily associated with stronger attitudes toward climate change, potentially due to

suggesting climate practices remain consistent across generations.

3. Institutional Setting: A statistically significant association emerged ($p=0.008$), with private hospital staff demonstrating substantially better practices than public hospital employees.
4. Occupational Role: The highly significant relationship ($p<0.001$) revealed physicians exhibited notably weaker practices compared to nurses, indicating profession strongly influences environmental behaviors.
5. Gender: No significant differences were found ($p=0.162$), with males and females demonstrating comparable practice levels.
6. Education: Advanced degrees showed no significant advantage ($p=0.193$), suggesting knowledge acquisition doesn't necessarily translate to better climate practices.

1.1 Establishing association Using Multivariable Logistic Regression Analysis

1.1.1 Association Between Sample Participants' Climate Change Knowledge and Demographic Variables Using Multivariable Regression Analysis

The multivariable logistic regression analysis revealed statistically significant associations between certain demographic variables and participants' climate change knowledge. Below is an interpretation of the key findings:

1. Hospital Type

A statistically significant difference ($p = 0.007$) was observed in climate change knowledge between employees of public hospitals compared to their counterparts in private hospitals. The adjusted odds ratio (aOR) was 2.240 (95% CI: 1.242–4.038), indicating that public hospital workers had significantly higher knowledge. This is further supported by the positive regression coefficient ($\beta = 0.806$), reflecting a positive trend in this relationship.

2. Education Level

The results showed that PhD holders had significantly greater climate change knowledge compared to diploma holders (reference group), with an adjusted odds ratio (aOR) of 2.494 (95% CI: 1.156–5.382; $p = 0.020$). This is reinforced by the

Conclusion

The study highlights a significant level of awareness regarding climate change among healthcare professionals in Sana'a, Yemen. While a majority of participants demonstrated familiarity with the concept of climate change and recognized its potential health impacts, there remains a notable gap between knowledge and active engagement in climate-related initiatives. The findings indicate that despite positive attitudes towards climate change, participation in awareness campaigns and practical actions is limited. This discrepancy emphasizes the need for targeted strategies to enhance not only knowledge but also practical involvement among healthcare professionals.

Recommendations

1. Enhanced Educational Interventions: Develop and implement comprehensive training programs focused on climate change and its health impacts for healthcare professionals. These programs should include practical applications and strategies for addressing climate-related health challenges.
2. Encourage Active Participation: Promote active involvement in climate change awareness campaigns and initiatives. Hospitals and healthcare institutions should facilitate participation by providing resources and support for staff engagement.
3. Utilize Social Media: Leverage social media platforms as a key channel for disseminating information on climate change. Given the high usage rates among professionals, targeted campaigns can effectively raise awareness and encourage dialogue.
4. Strengthen Collaboration: Foster partnerships between healthcare institutions, governmental agencies, and NGOs to create a unified approach to climate change education and action. Collaborative efforts can amplify the impact of educational initiatives and resource sharing.
5. Monitor and Evaluate: Establish mechanisms to regularly assess the knowledge, attitudes, and practices of healthcare professionals regarding climate change. Continuous evaluation will help identify gaps and inform future interventions.

variations in environmental awareness across disciplines or community influences.

Association Between Sample Participants' Climate Change Practices and Demographic Variables Using Multivariate Regression Analysis

This multivariate regression analysis examines statistically significant relationships between environmental practices and demographic variables among the study participants (n=353). Several variables demonstrated significant associations, as follows:

First, regarding hospital type, results showed that government hospital employees were significantly more likely to demonstrate positive climate change practices compared to their private hospital counterparts (aOR=2.082; 95% CI: 1.143-3.791; p=0.016). The regression coefficient ($\beta=0.733$) indicates a moderate positive effect of this variable.

Second, for the age variable, the 41-54 year age group showed the highest adjusted odds ratio (aOR=3.666; 95% CI: 1.046-12.854; p=0.042), followed by the 55-70 year group (aOR=6.291). These results suggest a non-linear relationship between age and environmental practices, with positive practices increasing with advancing age.

Regarding educational level, PhD holders showed the highest odds ratio (aOR=9.782; 95% CI: 1.032-92.727; p=0.047) compared to Master's degree holders (reference group). This indicates that higher educational levels are associated with more positive environmental practices.

In the analysis of professional experience, individuals with less than 5 years of experience were more likely to demonstrate positive practices (aOR=2.097; p=0.039), while the 11-14 years experience group showed a similar tendency (aOR=3.286; p=0.055). These findings may reflect greater climate change awareness among younger generations.

Discussing the current study with previous studies:

- Presenting the principles and relationships that emerged from the results, taking into account the non-repetition of results.
- Clarify the areas of agreement or contradiction between your results and their interpretation with the research published in your field.
- Discuss the possibility of applying the results of your research theoretically and practically

1.2 Sources of Knowledge
Social media was the primary source of information in Yemen, unlike Egypt (Elsharkawy et al., 2024), where TV and schools dominated. This underscores a global shift in information consumption patterns.

Current Study:

Social media was the leading source (79.5%), followed by newspapers (29.2%).

Previous Studies:

- Nigatu et al. (2014) (Ethiopia): Identified digital media as the main information source.
- Elsharkawy et al. (2024) (Egypt): Highlighted TV and schools/universities as top sources.

Comparison:

All studies confirm the role of digital platforms, but the current study emphasizes the dominance of social media, reflecting a broader global transition to digital engagement.

1.3 Practices and Behaviors Toward Climate Change

A knowledge-practice gap was observed, with limited environmental actions despite awareness. This pattern was also noted in France and India, but Yemen's participation rates were the lowest, suggesting institutional support deficits.

Current Study:

- 46% discussed climate-related health impacts.
- 20.2% participated in awareness campaigns.
- 41.6% took workplace mitigation measures.

Previous Studies:

- Guihenneuc et al. (2024) (France): 23.7% of workers initiated sustainability actions, citing administrative barriers.
- Sambath et al. (2022) (India): Healthcare workers understood direct impacts (e.g., vector-borne diseases) but lacked awareness of indirect effects (e.g., malnutrition).

Develop Mitigation Strategies: Encourage the development and implementation of specific climate adaptation and mitigation strategies within healthcare facilities. This may include energy efficiency initiatives and sustainable practices that reduce the carbon footprint of healthcare services.

Scientific Discussion and Conclusions

1. Scientific Discussion Compared to Previous Studies

1.1 Level of Knowledge on Climate Change and Its Health Impacts

The study revealed a balanced distribution of knowledge levels among participants, a finding that contrasts with studies from India (Ravi et al., 2024) and France (Guihenneuc et al., 2024), where higher knowledge levels were reported. This discrepancy may stem from differences in educational and media contexts.

Current

Study:

Results showed a relatively homogeneous distribution of knowledge levels among the sample (low: 34.1%, moderate: 33.3%, high: 32.5%), indicating no significant disparities.

Previous Studies:

- Ravi et al. (2024) (India): Found that 75% of nursing students had high knowledge of climate change, but only 48% recognized its major health impacts.
- Guihenneuc et al. (2024) (France): Focused on healthcare workers' environmental sustainability practices but did not directly measure knowledge.
- Kircher et al. (2022) (Minnesota): Reported that 75% of healthcare workers believed in climate change, but only 21% felt prepared to discuss it with patients.

Comparison:

The current study aligns with the Minnesota research in highlighting general awareness but a gap in practical readiness. The notable difference in knowledge levels between India and Yemen may reflect variations in educational curricula or media outreach.

- The knowledge-practice gap calls for hands-on training programs to bridge theory and action.
- Culturally and linguistically adapted educational materials are essential for effective outreach.

Recommendations

1. Curriculum Integration: Incorporate climate change and health into academic training for healthcare professionals.
2. Social Media Campaigns: Leverage platforms like Facebook and Twitter for awareness, given their widespread use.
3. Sustainability Committees: Establish hospital-based teams to monitor and promote environmental actions.
4. Workplace Initiatives: Implement energy conservation, recycling, and eco-friendly transport policies.
5. Localized Materials: Develop Arabic-language resources aligned with cultural norms to enhance engagement.

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Comparison:

While all studies reveal a knowledge-practice gap, the current study highlights lower engagement in Yemen, likely due to infrastructural or institutional challenges.

1.4 Influencing Factors
Hospital type and work experience significantly affected knowledge and behavior, partially aligning with Torre et al. (2023) and Kircher et al. (2022) but revealing Yemen's unique context.

Current Study:

- Work experience significantly correlated with knowledge ($p=0.018$).
- Hospital type (public/private) and job role influenced practices ($p=0.008$ and $p=0.000$, respectively).

Previous Studies:

- Torre et al. (2023) (Italy): Professionals had higher knowledge than students.
- Kircher et al. (2022): Found no significant differences between nurses and physicians.

Comparison:

Unlike prior research focusing on profession or education, this study underscores institutional environment (hospital type) as a key factor, possibly unique to Yemen.

1.5 Recommendations
Integrate climate change topics into health education, promote institutional sustainability practices, and tailor awareness campaigns to local language and culture.

2. Conclusions

- Healthcare workers in Sana'a hospitals demonstrated good general awareness of climate change and its health impacts, but this rarely translated into actionable practices.
- Social media emerged as the primary knowledge source, emphasizing its role in future health campaigns.
- Institutional factors (e.g., hospital type) strongly influenced behaviors, highlighting the need for organizational support.

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