NURSES' AWARENESS, CONCERN, MOTIVATION, AND BEHAVIOR TOWARD HEALTH AND CLIMATE CHANGE

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ABSTRACT
Climate change significantly impacts health, food security, housing, safety, and work through long-term shifts in temperature and weather patterns. In Jakarta, these changes have led to the city experiencing the worst air pollution in Indonesia, with an Air Quality Index (AQI) score of 161. Nurses play a vital role in educating the public about behavioral changes to mitigate the effects of climate change. This study aimed to assess nurses' awareness, concerns, motivation, and behaviors related to health and climate change in a private hospital in Jakarta. This quantitative descriptive study involved 92 respondents selected through purposive sampling. The data were collected using the Climate, Health, and Nursing Tool (CHANT) questionnaire. The analysis revealed that nurses' awareness of evidence-based information on climate change ranged from "somewhat familiar" to "moderately familiar." Their concerns about the impacts of climate change were rated from "somewhat concerned" to "moderately concerned." Nurses' motivation levels were reported as ranging from "somewhat motivated" to "very motivated" regarding health and climate change. Behavioral practices to mitigate climate change varied, with activities at home ranging from "rarely" to "often" and those in the hospital ranging from "sometimes" to "often." This research highlights the need to enhance nurses' knowledge and awareness of health and climate change and serves as a reference for future studies exploring the intersection of nursing, health, and climate change in Indonesia.

Keywords: Climate change, Indonesia, Motivation, Nurses, Weather

INTRODUCTION

Climate change refers to temperature and weather patterns in the long term. Over the past 2000 years, the greenhouse effect, driven largely by human activities, has been accelerating (United Nations, 2023). If this continues, they will likely lead to severe consequences, including prolonged droughts, water scarcity, wildfires, rising sea levels due to the melting of polar ice, flooding, storms, and a loss of biodiversity. Over time, these changes will significantly impact various sectors, including health, food, housing, safety, and work (United Nations, 2023).

In 2022, the Centers for Disease Control and Prevention highlighted the health impacts of climate change, noting that air pollution contributes to an increase in asthma and heart disease, while also exacerbating allergies. Additionally, climate-related changes to food systems have been linked to the spread of diseases such as cholera,

malnutrition, and diarrhea. Environmental damage is also expected to lead to an increase in mental health issues, further compounding the health burden.

Jakarta is recognized as having the worst air pollution in Indonesia and ranks as the third most polluted city globally, with an Air Quality Index (AQI) score of 161, classified as unhealthy (Ministry of Health of the Republic of Indonesia, 2023). According to the Global Burden of Disease Study (2019), air pollution in Jakarta was responsible for an estimated 5,054 deaths (equivalent to 54 deaths per 100,000 people). These fatalities contribute to a reduction in the productive workforce, increased healthcare expenditure, and a decline in the overall quality of life. Furthermore, a study by Syuhada et al. (2023), reported that air pollution accounts for more than 5,000 hospitalizations annually in Jakarta.

According to the Alliance of Nurses for Healthy Environments (2022), nurses are uniquely positioned professionals to convey and provide information to the public about behavioral changes necessary to address climate change. However, a study by Anåker et al. (2021) identified inconsistencies between nurses' awareness of climate and environmental issues and their daily behavioral patterns. Butterfield et al. (2021) emphasized that nurses hold significant potential as key professionals to disseminate information about climate change to the public. Nurses play a crucial role in mitigating and anticipating the impacts of climate change, particularly through health education, which serves as an important first step in addressing these challenges. To fulfill this role effectively, nurses need a strong understanding of climate change, supported by sustainable education and the integration of climate change topics into specialized nursing curricula Butterfield et al. (2021).

According to the Alliance of Nurses for Healthy Environments (2022), climate change has been recognized as a critical issue in the United States, particularly in the health sector, since 2018. In response, the United States implemented a program to educate 50,000 health workers by 2022. Similarly, Europe launched a conservation-focused initiative in 2021 to address the health impacts of climate change, resulting in the education of 6,537 nurses by 2022. In contrast, Indonesia has yet to conduct

studies on the effects of climate change on health in the nursing profession. This highlights the need to explore Indonesian nurses' awareness, concerns, motivation, and behaviors regarding health and climate change.

METHOD

This study employed a descriptive quantitative design with a sample of 92 nurses from a private hospital in Indonesia. Participants were selected using purposive sampling based on specific inclusion criteria: actively working nurses who were willing to participate in the study.

The instrument used in this research was the Climate, Health, and Nursing Tool (CHANT), which measured nurses' awareness, concern, motivation, and behavior regarding climate change (Schenk et al., 2023). To assess nurses' awareness of climate change and health, the questionnaire comprised closed-ended questions using a Likert scale. It included five questions with response options ranging from 1 ("I have never heard of this") to 5 ("I have definitely heard of this"). This section of the questionnaire demonstrated a high reliability score with an alpha value of 0.85.

To evaluate nurses' concerns about climate change and health, the questionnaire also employed a Likert scale with response options from 1 ("Not at all") to 5 ("Extremely"). This questionnaire had been tested for reliability with an alpha value of 0.91. Similarly, nurses' motivation toward climate change and health was assessed through closed-ended questions with Likert scale responses ranging from 1 ("Never") to 5 ("Always"). This questionnaire had been tested for reliability with an alpha value of 0.91. Lastly, the questionnaire measured nurses' behaviors related to climate change and health in two settings: home and work. These behaviors were assessed with Likert scale responses ranging from 1 ("Never") to 5 ("Always"). This questionnaire had been tested for reliability with an alpha value of 0.75 and 0.67.

Data collection was conducted through an online Google Form, which was distributed with the assistance of the Director of Nursing and the Clinical Nursing Educator. They facilitated the dissemination of the questionnaire to the nurses. Data analysis was performed using univariate descriptive

statistics in SPSS, with results presented as frequency distributions, percentages, means, and standard deviations for each variable. This research was ethically reviewed and approved by the Faculty of Nursing Ethics Committee of Pelita Harapan University, under letter number 008/KEPFON/I/2024.

RESULT

The findings presented in Table 1 indicate that most respondents were aged between 26 and 35 years, accounting for 39 respondents (42.4%). The majority of respondents were female, comprising 81 individuals (88%). Regarding the length of employment, the largest proportion of respondents had worked for 1 to 5 years, with 37 respondents (40.2%) falling into this category.

Table 1. Distribution of Characteristics Respondents (n=92)

Variable	Frequency (n)	Percentage (%)
Age		
17-25 years old	29	31.5
26-35 years old	39	42.4
36-56 years old	24	26.1
Gender		
Woman	81	88
Man	11	12
Length of Work		
<1 year	8	8.7
1-5 years	37	40.2
5-10 years	17	18.5
10-20 years	22	23.9
20-30 years	4	4.3
30-40 years	3	3.3
>40 years	1	1.1
Profession		
Head Nurse	1	1.1
Direct/Clinical Nurse	91	98.9
Professional Environment	27	29.3
Outpatient Hospital/Acute Care	65	70.7

The majority of respondents were employed in direct or clinical nursing roles, representing 91 respondents (98.9%). Additionally, most respondents worked in a professional acute care environment, totaling 65 individuals (70.7%).

Awareness

The research results presented in Table 2 indicate that 40 respondents (43.5%) were moderately familiar with the concept that the planet has warmed significantly since the 1850s, contributing to climate change, with a mean value of 3.47 (±1.05). A total of 36 respondents (39.1%) stated that they were moderately familiar with the idea that warming, which causes climate change, is primarily driven by human activities that add greenhouse gases (GHGs) to the atmosphere (such as the use of gas and coal to produce electricity, fuel for transportation, and modern agriculture), with a mean value of 3.77 (±1.07). Additionally, 24 respondents (26.1%) reported to be somewhat familiar with the statement that health service

delivery is responsible for greenhouse gas emissions contributing to warming, with a mean value of 2.83 (±1.21).

Furthermore, 42 respondents (45.7%) answered that they were moderately familiar with the statement that climate change increases the likelihood of adverse health conditions, such as heat stroke, asthma exacerbations, Lyme disease, and others, with a mean value of 3.60 (±1.03). Finally, 43 respondents (46.7%) stated they were moderately familiar with the statement that vulnerable populations, such as the very young, elderly, and other at-risk groups (e.g., people with weak economic conditions, the homeless, people of color, etc.), experience worse health impacts due to climate change, with a mean value of 3.55 (±1.13).

Concern

The research results presented in Table 3 indicate that 40 respondents (43.5%) expressed moderate concern about the health impacts related to climate change, with a mean value of 3.96 (±0.97). A total of 38 respondents (41.3%) were moderately concerned about the financial consequences of climate change, with a mean value of 3.90 (±1.07). Similarly, 36 respondents (39.1%) reported moderate concern about the overall impact of climate change on themselves, their families, or people they knew, with a mean value of 3.86 (±1.00). Additionally, 33 respondents (35.9%) expressed extreme concern about the overall impact of climate change on future generations, with a mean value of 3.92 (±1.05). Lastly, 29 respondents (31.5%) felt extremely worried about the changes to the planet due to climate change, with a mean value of 3.76 (±1.11).

Motivation

The research results in Table 4 reveal that 33 respondents (35.9%) reported being somewhat motivated and felt sufficiently prepared to face the impacts of climate change, with a mean value of 3.14 (±0.94). A total of 34 respondents (37%) were somewhat motivated to prevent further climate change, with a mean value of 3.11 (±0.94). The findings also showed that 60 respondents (65.2%) stated they had neutral motivation to change practices in order to reduce greenhouse gas contributions, with a mean value of 3.25 (±0.76). Additionally, 41 respondents (44.6%) expressed neutral motivation in teaching patients, clients, or community

members about how climate change impacts health, with the same percentage (44.6%) indicating that this statement was "true for me" in their approach to teaching. This had a mean value of 3.35 (±0.74). Lastly, 44 respondents (47.8%) reported having neutral motivation in preparing to face the health impacts of climate change in their workplace, with a mean value of 3.55 (±0.76).

Behavior at Home

The research results in Table 5 show that, regarding respondents' behavior at home, 34 respondents (37%) never used non-fossil fuel-based energy sources (such as wind or solar energy, geothermal, offset energy, etc.), with a mean value of 2.07 (±1.06). A total of 37 respondents (40.2%) often saved energy (such as using energy-saving equipment, maintaining moderate temperature settings, turning off lights and electronic devices, etc.), with a mean value of 3.72 (±0.95). Additionally, 39 respondents (42.4%) sometimes used less gasoline (by driving fuel-efficient vehicles, reducing unnecessary trips, cycling, etc.), with a mean value of 3.34 (±0.94). Moreover, 48 respondents (52.2%) sometimes reduced waste, with a mean value of 3.20 (±0.81), and 43 respondents (46.7%) sometimes chose food that required fewer resources to grow, with a mean value of 3.27 (±0.85).

Behavior at Work

The research results in Table 6 show that 35 respondents (38%) often engaged in behaviors related to saving energy (such as turning off lights and electronics) at work, with a mean value of 3.68 (±0.93). A total of 32 respondents (34.8%) sometimes traveled to work using active transportation (bicycle, walking), or engaged in other similar behaviors, with a mean value of 3.59 (±1.09). Furthermore, 42 respondents (45.7%) reported that they sometimes engaged in behaviors at work to reduce waste (such as plastic, paper, linen, and clinical supplies), with a mean value of 3.55 (±0.81). Additionally, 48 respondents (52.2%) indicated that they sometimes advocated at work for policies, products, and/or processes that produce fewer greenhouse gases (GHG), with a mean value of 2.69 (±0.99).

DISCUSSION

Awareness

Nurses' awareness of evidence-based statements on climate change ranges from somewhat familiar to moderately familiar, indicating a need for further awareness-building. Schenk et al. (2021) found similar results among 483 respondents, with a mean awareness score of 2.97 (±0.87), indicating moderate awareness. Other studies suggest that while awareness alone may not directly change nurses' behavior, it can enhance their concern and motivation to address climate change's societal impacts and causes.

The results of a literature review by Diallo et al. (2023) stated that nurses need more awareness and knowledge about climate change, its causes, and its impact on health. The findings from this research also highlight a gap between nurses' critical role in mitigating the effects of climate change on health and their need for knowledge and awareness. Increasing nurses' awareness and knowledge is expected to strengthen their role in advocating for patients vulnerable to climate change. A better understanding of climate issues among nurses enables them to assess risks more effectively and provide appropriate patient care and education. Schenk et al. (2021) suggest that nurses' awareness of climate change and health is shaped by their observations of patients, personal experiences, and information obtained from various sources, such as literature on diseases, local geography, and natural conditions related to climate change.

Concern

Nurses' concerns about climate change range from somewhat to moderate, indicating a need to heighten awareness of its impacts. Schenk et al. (2021) found that 469 respondents expressed concerns about addressing climate change, with an average score of 3.43 (±0.77). This reflects significant apprehension among nurses about future climate challenges.

Susilawati (2021) highlights that concerns regarding climate change stem from its health impacts, including increased risks of vector-borne diseases, non-communicable diseases like asthma and skin cancer, and heat-related conditions such as heat stroke. Climate change also intensifies heatwaves and contributes to higher risks of mental health disorders such as depression, anxiety, and stress. These health risks arise from direct impacts, such as disasters causing individual stressors like loss and damage, as well as secondary stressors,

such as job loss and financial worries.

The research results indicated that respondents witnessed health conditions worsened by climate change in patients, themselves, and their families, and in reports about others at varying frequencies. These findings underscore the need for increased attention to health impacts exacerbated by climate change. According to the American Nurses Association (2023), nurses are pivotal in adapting to and mitigating the health effects of climate change, including preparing for emerging diseases and educating communities about disaster preparedness and disease prevention strategies.

Motivation

Nurses' motivation regarding health and climate change ranges from somewhat to very motivated, indicating a need to further enhance motivation concerning climate change impacts. According to Schenk et al. (2021), 453 respondents expressed motivation to address climate change, with an average score of 3.27 (±0.89), showing significant motivation among nurses to act. Respondents were motivated by health impacts, a desire to maintain clean air and water, and concerns for the future. However, barriers to motivation include insufficient knowledge, complexity, and skepticism about human capability to mitigate climate change.

Nurses' motivation to confront climate change shapes efforts to prepare for worsening health impacts in the workplace. The Ministry of Health of the Republic of Indonesia (2016) underscores that climate change exacerbates health issues such as mosquito-borne diseases and water scarcity-related illnesses, including diarrhea, skin diseases, respiratory infections, malnutrition, and lung diseases. To combat these challenges, healthcare professionals must educate the public on hygiene practices and ensure access to clean water and adequate medical supplies.

According to Haryanto and Prahara (2019), motivation to address climate change is influenced by perceived direct and indirect impacts on water quality, forests, health, agriculture, wildlife habitats, and disease spread. Overcoming fatalistic beliefs about climate change's inevitability is crucial for boosting motivation. Expanding nurses' motivation regarding health and climate change can promote pro-environmental behaviors, such as environmental advocacy, participation in seminars, and support for

environmental initiatives.

Behavior

Nurses' behaviors at home to reduce climate change range from rarely to sometimes engaging, indicating inconsistent habits in mitigating climate change. Schenk et al. (2021) found that 457 nurses reported behaviors at home aimed at reducing climate impact, with an average score of 2.28 (± 0.75), suggesting occasional efforts rather than consistent actions. Nurses' behaviors at work also range from sometimes to often engaging in efforts to mitigate climate change, indicating room for improvement in preventing its exacerbation. In the same study by Schenk et al. (2021), 430 nurses exhibited behaviors to reduce climate impact at work, with an average score of 1.81 (± 0.85), highlighting more consistent efforts at home compared to the workplace.

The disparity in respondents' fossil fuel use reductions reflects the challenges nurses face due to workplace requirements, energy demands, infection control protocols, and other factors (Schenk et al., 2021). Increasing awareness and adopting behaviors like reducing electricity consumption, using energy-efficient lighting, minimizing vehicle use, promoting alternative transportation methods, and planting trees can mitigate the impacts of climate change (Mukono, 2020).

Healthcare facilities contribute to climate change through greenhouse gas emissions, waste disposal, and energy consumption. Health professionals can enhance environmental stewardship by fostering a climate-resilient workplace, reducing carbon emissions, and collaborating across sectors to address climate change and health (Kementerian Kesehatan Republik Indonesia [Ministry of Health of the Republic of Indonesia], 2024). Nurses, as accessible healthcare providers, can lead community efforts to mitigate climate change impacts both personally and professionally, benefiting patients, communities, and public health services.

This study has several limitations. First, the questionnaire was administered online, which prevented the researchers from directly clarifying the content to respondents and ensuring their understanding of the questions. Additionally, the sample is limited to nurses from a single private hospital, which restricts the generalizability of the findings to the broader population of nurses in Indonesia.

CONCLUSION

The majority of respondents demonstrated awareness ranging from somewhat familiar to moderately familiar with evidence-based information on climate change. Similarly, nurses' concerns about the impact of climate change were also in the range of somewhat to moderate. Nurses' motivation levels varied from somewhat to very motivated regarding health and climate change, and their behavioral habits in reducing climate change ranged from rarely to often engaged at home and from sometimes to often engaged in the hospital. This research contributes valuable information that can enhance nurses' awareness, concerns, motivation, and behaviors regarding health and climate change. It may serve as a reference for nurses in addressing climate change and promoting optimal health outcomes. Additionally, it provides nurses with greater insight into the impact of climate change on health and encourages the implementation of behaviors to reduce climate change as a form of applied knowledge.

Table 2. The Nurses' Awareness toward Health and Climate Change (n=92)

Awareness Question	Not at all familiar (1)		Slightly familiar (2)		Somewhat familiar (3)		Moderately Familiar (4)		Extremely familiar (5)		Mean Value (Std. Dev)
	n	%	n	%	n	%	n	%	n	%	
1. The planet has warmed significantly since the 1850s, causing climate change	4	4.3	14	15.2	21	22.8	40	43.5	13	14.1	3.47 (±1.05)
2. The warming that causes climate change is largely caused by human behavior that adds greenhouse gases (GHG) to the atmosphere (such as the use of gas and coal to produce electricity and heat buildings, fuel for transportation, and modern agriculture)	4	4.3	7	7.6	20	21.7	36	39.1	25	27.2	3.77 (±1.07)
3. Health care delivery is responsible for greenhouse gas emissions that contribute to warming	16	17.4	21	22.8	24	26.1	24	26.1	7	7.6	2.83 (±1.21)
4. Climate change increases the likelihood of adverse health conditions such as heat stroke, asthma exacerbations, Lyme disease, etc.	4	4.3	10	10.9	20	21.7	42	45.7	16	17.4	3.60 (±1.03)
5. Vulnerable populations such as the very young	7	7.6	10	10.9	16	17.4	43	46.7	16	17.4	3.55 (±1.13)

or old, and other at-risk groups (economically disadvantaged people, homeless people, people of color, etc.) experience worse health impacts from climate change	

Table 3. The Nurses' Concern toward Health and Climate Change (n=92)

Concern Question	Not at all (1)		Slightly (2)		Somewhat (3)		Moderately (4)		Extremely (5)		Mean Value (Std. Dev)
How worried are you about the following things, related to climate change?	n	%	n	%	n	%	N	%	n	%	
1. Health impacts	1	1.1	9	9.8	12	13	40	43.5	30	32.6	3.96 (±0.97)
2. Financial impact (rebuilding after hurricane or fire, health costs, etc.)	4	4.3	7	7.6	13	14.1	38	41.3	30	32.6	3.90 (±1.07)
3. The overall impact on you, your family, or someone you know at this time	1	1.1	10	10.9	17	18.5	36	39.1	28	30.4	3.86 (±1.00)
4. Overall impact on future generations	3	3.3	5	5.4	21	22.8	30	32.6	33	35.9	3.92 (±1.05)
5. Changes to the planet (other species, forests, oceans, etc.)	3	3.3	10	10.9	22	23.9	28	30.4	29	31.5	3.76 (±1.11)

Table 4. The Nurses' Motivation toward Health and Climate Change (n=92)

Motivation Questions	Not at all (1)		Slightly (2)		Somewhat (3)		Very (4)		Extremely (5)		Mean Value (Std. Dev)
How optimistic are you that humans will:	n	%	n	%	n	%	n	%	n	%	
1. Have you prepared enough to face the impacts of climate change?	2	2.2	23	25	33	35.9	28	30.4	6	6.5	3.14 (±0.94)
2. Prevent further climate change?	4	4.3	21	22.8	30	32.6	34	37.0	3	3.3	3.11 (±0.94)

Motivation Questions	Very untrue to me (1)		Somewhat untrue for me (2)		Neutral (3)		True for me (4)		Very true for me (5)		Mean Value (Std. Dev)
Please indicate how true the following statements are for you.	n	%	n	%	n	%	N	%	n	%	
1. I want to change my practices to reduce my GHG (Greenhouse Gas) contribution	3	3.3	3	3.3	60	65.2	20	21.7	6	6.5	3.25 (±0.76)
2. I want to teach patients/clients/community members about how climate change impacts health	2	2.2	2	2.2	41	44.6	41	44.6	6	6.5	3.35 (±0.74)
3. I want to be prepared for the health impacts of climate change in my workplace	1	1.1	2	2.2	44	47.8	35	38	10	10.9	3.55 (±0.76)

Table 5. The Nurses' Behavior at Home toward Health and Climate Change (n=92)

Behavioral Questions	**Never (1)**		**Rarely (2)**		**Sometimes (3)**		**Often (4)**		**Always (5)**		**Mean Value (Std. Dev)**
How often do you do the following behaviors at home:	n	%	n	%	n	%	n	%	n	%	
1. Using non-fossil fuel-based energy sources (such as purchasing wind or solar energy, geothermal, purchasing offset energy, etc.)	34	37	28	30.4	22	23.9	5	5.4	3	3.3	2.07 (±1.06)
2. Conserve energy (such as using energy efficient appliances, keeping moderate temperature settings, turning off lights and electronic devices, etc.)	2	2.2	6	6.5	27	29.3	37	40.2	20	21.7	3.72 (±0.95)
3. Use less gasoline (drive fuel-efficient vehicles, reduce unnecessary trips, bike rides, etc.)	2	2.2	13	14.1	39	42.4	27	29.3	11	12	3.34 (±0.94)
4. Reduce waste (buy less, reuse more, recycle and compost more)	2	2.2	12	13	48	52.2	25	27.2	5	5.4	3.20 (±0.81)
5. Choose foods that require fewer resources to grow/produce (local, seasonal, fewer animal products, less packaging)	2	2.2	12	13	43	46.7	29	31.5	6	6.5	3.27 (±0.85)

Table 6. The Nurses' Behavior at Workplace toward Health and Climate Change (n=92)

Behavioral Questions	**Never (1)**		**Rarely (2)**		**Sometimes (3)**		**Often (4)**		**Always (5)**		**Mean Value (Std. Dev)**
How often do you engage in the following behaviors at work:	n	%	n	%	n	%	n	%	n	%	
1. Save energy (like turning off lights and electronics, etc.)	1	1.1	8	8.7	29	31.5	35	38	19	20.7	3.68 (±0.93)
2. Travel to work using active (bicycle, walking), shared, or public transportation	2	2.2	12	13	32	34.8	21	22.8	25	27.2	3.59 (±1.09)
3. Reduce waste (plastic, paper, linen, clinical supplies, etc.)	0	0	6	6.5	42	45.7	31	33.7	13	14.1	3.55 (±0.81)
4. Ask your workplace leaders to support policies, products and/or processes that emit fewer Greenhouse Gases (GHGs)	15	16.3	15	16.3	48	52.2	11	12	3	3.3	2.69 (±0.99)

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