

## Green Healthcare Awareness, Attitudes and Practices Among Undergraduate Students

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### Abstract

**Background:** Healthcare sectors are one of the sectors that contribute to environmental degradation through waste generation, energy use, and greenhouse gas emissions, hence the need to inculcate green healthcare practices in future professionals.

**Objectives:** The study aimed to evaluate awareness, attitude, and practice levels in green healthcare among undergraduate Bachelor in Healthcare Management students in Nepal, as well as their associations.

**Methods:** A descriptive cross-sectional study was done among 205 BHCM students using an online structured questionnaire. Analysis was done using SPSS software with a one-sample t-test, ANOVA, and correlation.

**Findings:** BHCM students showed significant awareness above the neutral point for green healthcare ( $M=3.91$ ,  $t=18.68$ ,  $p<.001$ ). No significant differences were found in BHCM students' attitudes based on their faculties of study ( $F=0.611$ ,  $p=.544$ ). Moderate positive correlations were found for awareness with practice ( $r=0.512$ ,  $p<.01$ ) and practice with advocacy ( $r=0.569$ ,  $p<.01$ ).

**Conclusion:** BHCM students showed positive awareness and attitudes towards green healthcare. The moderate positive correlations for awareness with practice indicated a significant knowledge-behavior gap.

**Implication:** It is important for academic institutions to provide experiential learning strategies for healthcare students to change awareness into practice.

**Keywords:** Attitudes; Awareness; Green healthcare; Practices; Undergraduate students

## **Introduction**

With the visible effects of climate change and environmental destruction being seen around the globe, the link between the environment we live in and human health is making the news. It is in this context that the concept of green healthcare was created. The idea is to minimize the healthcare footprint without compromising the safety and efficacy of the healthcare provided. It includes the minimization of waste, improved energy efficiency, the use of sustainable resources, and the promotion of environmentally friendly behavior in the clinical as well as non-clinical settings.

These strategies range from the minimization of medical waste through the optimal management of waste to the enhancement of energy efficiency in the hospital using modern technologies to the application of sustainable materials in the construction process, as well as the promotion of eco-friendly health in the health professionals and the patients. It is closely associated with the general concept of sustainability, which not only considers the environmental aspect of health care delivery but also the social and economic dimensions ([Lamichhane et al., 2025](#)).

In the first place, it is worth noting that the health sector, as much as it is essential in the delivery of health care services to the public, is one of the key contributors to environmental pollution, including the emission of greenhouse gases ([Anas et al., 2025](#)). It is in this context that the next generation of health care professionals is being prepared to grasp the concept of sustainability in their respective fields of work. The students in the Bachelor in Health Care Management program are being prepared to manage the hospitals, health services, and public health programs which have significant impacts in the promotion of environmental health.

Although studies have proven that the youth of today care about the environment, this does not necessarily mean they practice what they preach. For instance, they may be aware of the need to protect the environment from the effects of plastic use and the need to conserve energy, but this may not be reflected in their practice. Therefore, the need to further investigate the factors influencing or impeding the practice of green healthcare by BHCM students who are the future leaders in the health system cannot be overstated. Additionally, health care facilities are actively seeking ways to minimize their footprint on the environment and enhance their sustainability. The health sector has faced significant challenges over the years due to occurrences such as the COVID-19 pandemic, thus the need to investigate the impact of environmental initiatives on the sustainability of the health sector ([Ghimire et al., 2025](#); [Acharya et al., 2024](#)).

This shows that hospitals and health facilities use a lot of resources such as electricity and water, which in turn affects the environment. Hospitals and health facilities must embrace sustainability in order to ensure that the activities carried out in the facilities promote human well-being and health without compromising the quality, accessibility, and affordability of the health services provided in the facilities ([Dion, 2023](#)). Hospitals that embrace sustainability in the operations of the facilities may be able to make ecological improvements to the facilities. This shows that the facilities may be able to save more money. Therefore, the health industry

may be able to save more resources in terms of time and energy by embracing sustainability. This may help in reducing the carbon footprint of the health industry. The health facilities may be able to finance sustainability in new and creative ways. The health facilities may be able to sell the carbon credits to the organizations that emit more carbon than permissible by their legally binding commitment.

### **Statement of the problem**

Hospitals, which are essentially places for healing, are inadvertently harming the environment. This is a major issue since, with an increasing number of people in need of medical care, it is worsening. This is an area where leaders are needed, leaders who will help bring sustainability into the healthcare industry ([Ismael et al., 2025](#)). The dilemma is how we will ensure that the next generation of healthcare workers will have the information and enthusiasm needed to make the healthcare industry more "green" and less detrimental to our world.

In Nepal, there are some issues at play. With the increasing number of injuries, there is a growing need for those in the healthcare industry to keep up ([Joshi et al., 2021](#)). Although there has been some success in this area, there is still a way to go in terms of awareness and implementation of sustainable practices. It can sometimes be hard to implement sustainable practices because of a lack of resources and infrastructure, as well as a lack of education among those in the healthcare industry.

### **Significance of Study**

- This study focuses on the responsibility of future health professionals in embracing and advocating for green practices in the health sector.
- This study is instrumental in determining the gaps in the understanding of green healthcare among undergraduate students.
- This study is important in providing information that can be used by academic institutions in incorporating green healthcare into their health-related courses.
- This study encourages students to embrace green practices in their respective institutions of higher learning and their future work environments.
- This study is important in promoting the sustainability agenda of the international community, as espoused by the UN Sustainable Development Goals (SDGs). Specifically, the study contributes to the realization of SDGs 3 (Good Health and Wellbeing) and 13 (Climate Action).

### **Research Questions**

- **Awareness**
  - How aware are undergraduate students of Green Healthcare Concept?
  - What is the level of awareness concerning medical waste management, energy saving practices, and telemedicine impact on the environment?
- **Attitudes**
  - What are the attitudes of undergraduate students towards sustainability in healthcare?
  - Do undergraduate students associate patient health outcome with sustainability in the environment?

- **Practices**
- How often do undergraduate students practice sustainability actions?
- Are undergraduate students active in promoting Green Healthcare?

#### Research Objectives

- To assess awareness of Green Healthcare principles among students.
- To evaluate student's attitudes toward sustainability roles in healthcare.
- To examine practices related to waste management, energy use and advocacy.

#### Research Hypothesis

Based on the objectives of the study the following are the hypotheses that have been generated:

- H1: There is a high level of awareness of green healthcare among students.
- H2: There is no significant difference in attitudes across faculties.
- H3: There is significant correlation between sustainable practices and advocacy.
- H4: There is significant correlation between sustainable practices and awareness.

#### Conceptual Framework

As the world becomes more conscious of climate change and environmental sustainability, healthcare isn't left behind. Today's healthcare students, our future health leaders need to understand and engage in environmentally responsible behaviors.

This framework explores how what students know (awareness) and how they feel (attitudes) about green healthcare influence what they actually do (practices). It also considers how university support and what they're taught in class may encourage or limit their actions.

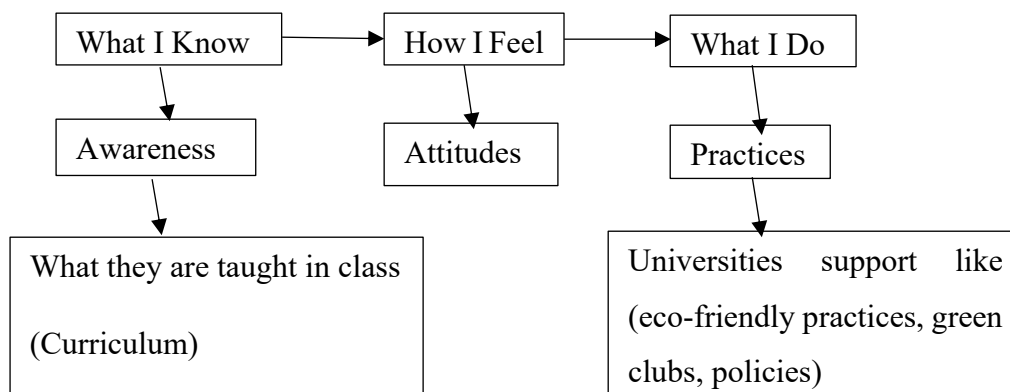


Figure 1: Conceptual Framework of Green Healthcare awareness, attitudes and practices among Undergraduate Students.

The conceptual framework shows that when students learn about the green healthcare (Awareness). Then this will help shape how they feel about it (Attitudes). Then, based on what they know and feel, they take action (Practices). But how much they do also depends on:

- What they're taught in class
- How much their university provides

#### Literature Review

A lot of research has been done on the importance of creating awareness and having positive attitudes towards green/sustainable healthcare practices in the reduction of carbon emission,

improper disposal of medical wastes, which affect the environment, the unnecessary use of energy sources, and understanding the role played by single-use plastics in environmental pollution in the field of healthcare. For the students in the field of healthcare management, their awareness of green/sustainable healthcare practices would be more important, as it will influence their decisions in the future. In the last few decades, environmental problems such as climate change, pollution, and depletion of resources have become a concern for the sustainability of healthcare. A healthcare facility, being a resource-consuming organization, contributes significantly to environmental degradation in terms of energy consumption, waste generation, and greenhouse emission ([Lee & Lee, 2025](#)).

The healthcare sector is, by its very nature, committed to the preservation of human health, but the operational and infrastructural needs of the healthcare system all over the world do pose an environmental burden, and this is an unintended but severe consequence of healthcare system, which is now becoming difficult to overlook ([Balabanova et al., 2013](#)).

For example, emission from healthcare facilities and energy sources, which is linked to respiratory diseases and other chronic conditions, particularly among vulnerable populations. The irony of this situation, therefore, points to the need to identify ways to develop sustainable solutions to enable healthcare systems to mitigate its negative impacts without compromising patient care. In recognition of this, for example, the World Health Organization (WHO) and other global health bodies have recognized the need for transformation in healthcare systems, with sustainability as an essential component of healthcare systems ([Emmerling, 2019](#)).

The WHO has stated that environmental health is crucial in attaining the global health goals and has highlighted the need for the development of “greener” healthcare practices in order to mitigate the effects of climate change on human health. This includes the development of energy-efficient infrastructures, sustainable procurement, waste reduction, and the development of low-carbon technologies ([Chu et al., 2022](#)). Thus, the need for the development of the concept of “Green Healthcare” has been highlighted, which will provide healthcare services without harming the environment and at the same time provide high standards of healthcare. This is in line with the overall objectives of sustainable development ([Balabanova et al., 2013](#)).

The healthcare sector is an important component to achieve the objectives of sustainable development. Although this sector is directly related to only one Sustainable Development Goal (Goal 3: Ensuring a healthy life and promoting wellbeing at all ages), this sector itself, while aiming to provide health and protect health, is the major emitter of environmental pollutants with adverse health impacts. Therefore, sustainability is an important component to be addressed by healthcare organizations, and this is important to be addressed by the leadership ([Tessema, 2025](#)).

One of the key issues in the healthcare industry is sustainable development. While only the third Sustainable Development Goal (SDG), which is “ensuring healthy living and promoting well-being for all ages” is relevant to the health sector, other Sustainable Development Goals like the ones related to hunger, gender equality, water, sanitation, affordable and clean energy, sustainable cities and communities, climate change, peace, justice, and strong institutions,

which have 43 health-related indicators, are relevant to the industry indirectly ([Chu et al., 2022](#)). While the last two decades have been characterized as the golden age in global health because of the increased national health spending and donor funding by low and middle-income countries, which has led to improvements in health determinants like access to clean water and sanitation, as well as health services like vaccination, antenatal care, and HIV treatment ([Balabanova et al., 2013](#)).

However, meeting the health needs of the population has a negative impact on the natural environment, as health care is one of the main emitters of environmental pollution, which has a negative impact on health. Total gas emission by healthcare organizations in the US has risen by 6% over the seven years from 2010 to 2018. India has generated more than 33,000 tons of medical waste in the seven months of the pandemic. Healthcare, which includes pharmaceuticals, has a negative impact on the natural environment and has contributed to 4.4% of the total greenhouse gas emission globally. Additionally, the total medical waste management market globally was estimated to be around 6.8 billion US dollars in 2020 and is expected to grow to 9 billion US dollars by 2025. This negative impact was further exacerbated during the COVID-19 pandemic, mainly as a result of the heightened activities within the health sector and the heightened use of personal protective equipment (PPE) as well as diagnostic tools and vaccines for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which in both cases resulted in an increase in the generation of medical waste. ([Anas et al., 2025](#)). Thus, the healthcare sector aims at becoming a sustainable sector.

Sustainable healthcare can be defined as it was suggested: “a complex system of interacting approaches to the restoration, management and optimization of human health that has an ecological base, that is environmentally, economically and socially viable indefinitely, that functions harmoniously both with the human body and the non-human environment, and which does not result in unfair or disproportionate impacts on any significant contributory element of the healthcare system” ([Tessema et al., 2025](#)). The term used in the definition of sustainable healthcare is ‘green healthcare,’ which means the delivery of healthcare services in an environmentally friendly way with the aim of promoting health in the community.

Unfortunately, awareness among the healthcare community regarding the negative impact of the sector on the natural environment and society, and consequently the responsibility for dealing with it, is at a very low level. To support health systems sustainably, leadership is required at all levels, both at the level of green politics and at the level of influencing and shaping the attitudes of members of the health community and organizations ([Shah & Asghar, 2024](#)).



Figure 2: Sustainability cluster (Wozny & Rataj, 2023)

**Cluster 1: “Sustainability”** is presented in Figure 2, this cluster includes 20 terms: building sustainability assessment methods, environmental sustainability, sustainable development, sustainable employability, sustainable enterprise, sustainable healthcare, sustainable healthcare supply chain, sustainable healthcare systems, sustainable transportation, environmental sustainability, social sustainability, sustainable behaviors, sustainable business models, sustainable competitive advantage, sustainable design, sustainable development goals (SDGs), sustainable diets, sustainable (Wozny & Rataj, 2023).



Figure 3 :Climate cluster (Wozny & Rataj, 2023)

**Cluster 2: “Climate”** is presented in Figure 3, this cluster includes 19 terms: climate change, climate change and health, environmental hazards, environmental health, environmental health inequalities, Environmental scan, environmental sustainability, green care, green economies, green exercise, green gentrification, green growth strategies, green hospital, green public health, green space, hazardous waste, healthcare waste management, waste minimization assessment, creating and utilizing resources, ecological crisis ([Tessema et al., 2025](#)).



**Figure 4: Digital Transformation cluster** (Wozny & Rataj, 2023)

**Cluster 3: “Digital Transformation”** is presented in Figure 4, this cluster 17 terms: digital innovation, digital platforms, digital policy, Internet of Health Things (IoHT), telemedicine, decision support, decision-making, decision-making tool, digital health, digital health ecosystem, telehealth, telemedicine, telemedicine service, ecosystem services (ESs), digital dentistry, health technology development, healthcare informatics. New technology has numerous applications in healthcare allowing for lowering medical costs, upgrading the quality and efficiency of medical procedures, improving healthcare pathways, and giving better control over resource management. All these factors in the healthcare sector contribute to the implementation of sustainable development as promoted and recommended by United Nations (Wozny & Rataj, 2023).

#### **The Role of Education in Promoting Green Practices**

Education is a powerful tool for encouraging a culture of sustainability in the healthcare sector. Integrating sustainability concepts into medical and health sciences curricula can intensify awareness and motivate proactive behavior among students. Additionally, experiential learning opportunities, such as internships and community projects, can reinforce theoretical knowledge and enable students to apply sustainability principles in real-world settings (Tessema et al., 2025).

For the practicing professionals, there could be continuing education programs for acquiring necessary skills on sustainability in the health sector. Organizational support is another factor that is important for the promotion of sustainability in the healthcare sector. Healthcare organizations need to create an organizational culture for innovation, cooperation, and responsibility for the promotion of green practice. This is important for the implementation of sustainability at the organizational level (Tessema et al., 2025).

#### **Barriers to Green and Sustainable Healthcare**

Despite the benefits of green and sustainable healthcare, there are various impediments to the adoption of green and sustainable healthcare. These impediments include financial issues, lack of awareness, and change resistance. For instance, adopting green and sustainable sources of energy or establishing a waste management system may prove to be costly, thereby becoming

a financial burden on the financially challenged healthcare industry. Secondly, the absence of standardized guidelines for measuring sustainability performance is another impediment to green and sustainable healthcare (Topcu & Kiraz, 2025). Another impediment to green and sustainable healthcare is the lack of awareness or understanding of the importance of sustainability compared to other needs. This can be addressed by employing a strategic approach to these impediments, which involves establishing policies and providing incentives as well as raising awareness regarding the importance of green and sustainable healthcare (Chu et al., 2022).

#### **Awareness of Green (Sustainable) Healthcare**

Several studies show that awareness of the impact of healthcare activities on the environment is the key as awareness of concepts such as carbon footprint, energy efficiency, and waste management enables students to address environmental issues with their roles as professionals (Topcu & Kiraz, 2025). Awareness in this case is the extent of knowledge that the students have about the impact of healthcare activities on the environment.

In one study carried out among nursing students in Egypt, the students were aware of the term "carbon footprint" and its relationship with health and environmental problems such as "respiratory problems, circulatory problems, or immune system problems" (Chu et al., 2022). Educational programs addressing the lack of detailed knowledge about green practices vital. The curriculum should include practical knowledge about green practices. The students should be exposed to green practices in their education; otherwise, they will not consider it part of their duty as professionals. Frameworks can be established globally to standardize these educational programs (Gupta, Shantharam, & MacDonald, 2022).

#### **Attitudes Toward Green (Sustainable) Healthcare**

Attitude is the manifestation of the student's perception of their feelings towards sustainability in healthcare and the importance of the issue. Moreover, attitude is developed or formed based on the student's personal values, influence of others, and the importance of environmental responsibility in healthcare. A positive attitude is associated with the student's perception of the overall benefits of sustainability in healthcare. Nevertheless, in the majority of healthcare settings, the attitude towards sustainability is two-sided, with the importance of the issue being secondary compared to the primary task of providing healthcare services (Lister, et al., 2022). Hospitals that adopt the strategy of promoting sustainability in healthcare, such as reducing plastic waste or using alternative energy sources, can encourage employees' engagement in green practices. Additionally, the adoption of the strategy of considering sustainability in healthcare as an ethical issue in alignment with the Hippocratic Oath of "do no harm" can enhance the positive attitude of healthcare employees or students (Topcu & Kiraz, 2025). Attitude is associated with the student's perception of the application of "hands-on" learning methods in relation to sustainability in healthcare.

#### **Green (Sustainable) Healthcare Practices**

Green practices signify a pledge to reduce the environmental footprint of healthcare service delivery by using environmentally safe approaches. These approaches seek to reduce environmental footprints, conserve resources, and provide a healthy environment to the

patients, staff, and communities. These approaches seek to align healthcare service delivery with environmental stewardship. Implementing the approaches require a holistic approach to the entire lifecycle of healthcare service delivery.

Nursing students demonstrated a positive intention to engage in green behaviors such as energy saving, recycling, and green advocacy after the training. Knowledge gain was linked to stronger green advocacy intention ([Othman, Abdelall, & Ali, 2025](#)). Awareness, support intention, and intention, in the presence of knowledge, signify the demonstration of behaviors.

### **Interrelationship Among Awareness, Attitudes, and Practices**

These three aspects, awareness, attitudes, and practice, are closely linked, often creating a cycle which can either support or hinder practice in one direction or another. Students who are aware of green healthcare are those who have knowledge about green practice, as well as its effect on the environment. Students who have higher levels of awareness will make better choices with regard to their health and environmental care.

Student attitudes towards green healthcare are formed based on the level of knowledge students have. Students who develop positive attitudes towards green healthcare will adopt green practice due to positive thinking. Students who lack knowledge about environmental care develop either negative or indifferent attitudes.

Students who practice green healthcare demonstrate their daily actions through recycling and waste reduction and selection of sustainable products. Students' practices in green healthcare result from their combination of awareness and their attitudes. Students who understand green healthcare principles and maintain positive views about it tend to practice sustainability. However, when awareness is low, attitudes may be based on general environmental beliefs rather than healthcare-specific knowledge. Likewise, positive attitudes without practical knowledge or institutional support may result in low levels of actual practice.

### **The Role of Healthcare Students**

The students, who will be the future leaders in the healthcare industry, are at a critical position where they can make a significant change in the industry. In addition, the integration of environmental health in the study of medicine and nursing is essential in ensuring that the students are provided with the appropriate knowledge and skills required for the promotion of sustainability in the healthcare industry. This will be a significant means of promoting sustainability in the healthcare industry since the future leaders will be provided with the appropriate knowledge and skills required for the promotion of sustainability in the industry ([Rasool et al., 2024](#)).

### **Students: Drivers of Change**

Healthcare students present a special opportunity for the integration of sustainability into the future of the sector. The application of the concept of sustainability in the form of internships and projects, such as green hospital initiatives, enables students to acquire the necessary skill set and sense of responsibility towards the natural world. The students' open-mindedness makes them the best agents for the integration of green practices into the healthcare system. In summary, the literature review has demonstrated the following points: The healthcare sector must urgently adopt sustainable practices because the sector's negative impact on the

environment contradicts its health-promoting role. The healthcare industry has recognized Green healthcare as an essential practice because it integrates environmentally friendly practices. BHCM students who will be the leaders in the healthcare sector in the future must embrace this practice. The healthcare sector lacks both sufficient knowledge and responsibility in the application of sustainability practices. The sector must be educated on sustainability and environmentally conscious decision-making to create a health system.

## **Methodology**

### **Research Approach**

To statistically assessing the level of awareness, attitudes and practices related to green healthcare among undergraduate students (BHCM) this study employed a quantitative research approach, which was ideal for testing hypotheses. Quantitative methods enabled the measurement of variables in an objective manner and the application of statistical methods for analyzing the relationships between variables. Quantitative methods included the scientific study of observable phenomena by applying statistical, mathematical, and/or computational methods.

### **Research Design**

The study used a descriptive cross-sectional research design. The basic purpose of the study was to measure the existing levels of awareness, attitudes, and practices without changing the variables. This research design helped in understanding the patterns and trends among the undergraduate students (BHCM) regarding the understanding and implementation of green healthcare practices.

### **Setting of the Study**

The research was conducted across multiple colleges offering Bachelor in Healthcare Management (BHCM) program. The study was conducted using an online Google Forms survey among bachelor's healthcare management students. Students who were actively enrolled and attending academic classes during the study period were considered. Conducting the study in an academic setting ensured that the data collected was relevant and specific to the population being studied.

### **Study Population**

The study participants included BHCM undergraduate students who were at least 18 years of age. This group was chosen because it is relevant in the field of healthcare management and has the potential for influencing the development of environmentally sustainable healthcare systems.

## Sample Size Determination

### Sample Size Calculator

#### Find Out The Sample Size

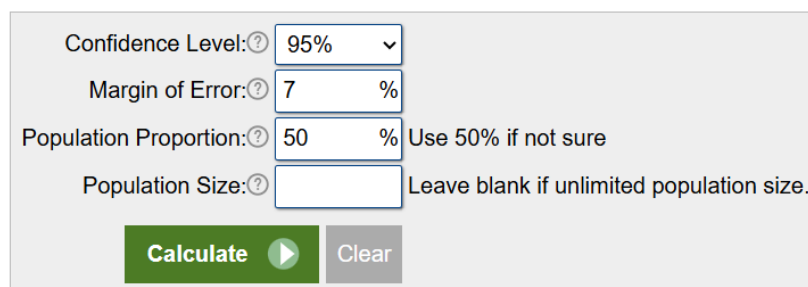
This calculator computes the minimum number of necessary samples to meet the desired statistical constraints.

#### Result



Sample size: **196**

This means 196 or more measurements/surveys are needed to have a confidence level of 95% that the real value is within  $\pm 7\%$  of the measured/surveyed value.



Confidence Level: 95%  
Margin of Error: 7%  
Population Proportion: 50% Use 50% if not sure  
Population Size: Leave blank if unlimited population size.  
Calculate Clear

Figure 5: Sample Size Calculator (Calculator.net, n.d.)

In order to find out the minimum required sample size for conducting this particular research, an online tool named 'Sample Size Calculator' was used. From the above figure, it can be clearly seen that the sample size for conducting this particular research has been calculated based on the following statistical parameters:

Confidence Level: 95%

Margin of Error: 7%

Population Proportion: 50% (this parameter is used when the actual proportion is unknown)

Population Size: This parameter has been left blank as the population size can be considered large or unknown

After providing these parameters to the 'Sample Size Calculator' tool, the required sample size for conducting this particular research has been calculated as 196. This means that at least 196 undergraduate students have to be surveyed for conducting this particular research so that the results can be stated as having a 95% confidence level and a  $\pm 7\%$  margin of error. This sample size will be sufficient for conducting quantitative research on awareness, attitudes, and practices concerning 'green healthcare' among undergraduate students (BHCM).

#### Criteria for Sample Selection

##### Inclusion Criteria

- Enrolled BHCM students.
- Students who have a proper understanding of the study's core topics.

##### Exclusion Criteria

- Students who are not interested in participating.

- Students with mental health issues that could affect their ability to provide accurate responses.

### **Sampling Technique**

To choose a participant, a convenience sampling technique was employed. This sampling method is significant to strengthen the representativeness of the sample and the generalizability of the research results. It is a way of selecting participants from the target population based on ease of access.

### **Data Collection Tool**

The study's main data collection tool was structured questionnaire which includes demographic information, awareness of green healthcare, attitudes towards green healthcare, and practices related to green healthcare. Responses were captured using Likert scale ranging from "Strongly Disagree" to "Strongly Agree".

### **Description of the Tool**

A through questionnaire is used as the data collecting method in this study to assess the level of awareness, attitudes, and practices of undergraduate students (BHCM) towards green healthcare. This questionnaire was administered in English and most questions are rated on a scale of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

### **Data Collection Procedure**

The questionnaire was made available for participants to fill out electronically. Before participants began answering the questions, they were requested to give their informed consent. This was achieved by the use of electronic surveys, which provided a high rate of response and made it convenient for participants. All the information provided by participants was anonymous.

### **Plan of Analysis**

The information obtained from the participants through the structured questionnaire was analyzed by the help of the Statistical Package for Social Sciences (SPSS).

### **Results and Analysis**

The primary objective of the analysis is to identify relationships and key insights related to student's understanding and adoption of environmentally sustainable practices in healthcare.

### **Demographic Variable**

The information was gathered via an online survey sent to college students at different campuses. This segment provides the demographic characteristics of the respondents and describe the techniques employed to examine and understand the primary data collected via the survey. This method enables a through grasp of the demographic traits of the respondents.

**Table 1**

*Gender*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	66	32.2	32.2
	Female	137	66.8	99.0
	Other	2	1.0	100.0
	Total	205	100.0	100.0

*Source: Field Survey 2025*

Table 1 is the gender distribution table, which shows data from a sample of participants amounting to a total of 205. Out of these participants, females dominated the sample since they were the majority at 66.8%, amounting to 137 participants. Males were the minority in the sample since they amounted to only 66 participants, which is 32.2% of the sample. There were only 2 participants, amounting to 1.0%, who did not identify their gender as female or male but rather as another category. This shows that there is a large gap between the number of females and males in the sample, with females representing about two-thirds of the entire population.

**Table 2**

*Semester*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First Semester	9	4.4	4.4
	Second Semester	40	19.5	23.9
	Third Semester	4	2.0	25.9
	Fourth Semester	43	21.0	46.8
	Fifth Semester	10	4.9	51.7
	Sixth Semester	35	17.1	68.8
	Seventh Semester	38	18.5	87.3
	Eighth Semester	26	12.7	100.0
	Total	205	100.0	100.0

*Source: Field Survey 2025*

Table 2 shows the representation of the respondents based on different semesters out of a total of 205 participants. The largest number of participants were found in the fourth semester, with 43 students representing 21.0% of the sample. This is closely followed by those in the second semester, representing 19.5% or 40 students, and then those in the seventh semester, representing 18.5% or 38 students. There were also a significant number of participants from the sixth semester, representing 17.1% or 35 students. The eighth semester contributed 12.7% or 26 students to our sample. On the other hand, there were fewer participants in the fifth semester, representing 4.9% or 10 students. There were 9 students representing 4.4% or those in their first semester. Finally, there were only 2.0% or 4 students representing those in their third semester.

**Table 3**

*Age of respondents*

	Frequency	Percent	Valid Percent	Cumulative Percent
	18	4	2.0	2.0
	19	21	10.2	12.2
	20	25	12.2	24.4
	21	26	12.7	37.1
	22	49	23.9	61.0
	23	29	14.1	75.1
	24	16	7.8	82.9
Valid	25	16	7.8	90.7
	26	7	3.4	94.1
	27	2	1.0	95.1
	28	2	1.0	96.1
	29	4	2.0	98.0
	30	3	1.5	99.5
	36	1	.5	100.0
Total	205	100.0	100.0	

*Source: Field Survey 2025*

Table 3 shows the distribution of the 205 respondents based on their ages. Most of the respondents were 22 years old, and they constituted 49 participants or 23.9% of the total number of respondents. This was followed by those aged 23 years (14.1%), 21 years (12.7%), and 20 years (12.2%). The number of respondents aged 19 years was 10.2%, while those aged 24 and 25 years constituted 7.8% of the total number of respondents. Other respondents were also recorded in the different age brackets, such as 26 years (3.4%), 18 and 29 years (2.0%), and 27 and 28 years (1.0%). However, a small number of participants were recorded in the 30 and 36 years' brackets, i.e., 1.5 and 0.5%, respectively. From the above table, it is clear that the majority of the respondents were in their early twenties.

**Table 4**

*Father's education*

	Frequency	Percent	Valid Percent	Cumulative Percent
	Bachelors	55	26.8	26.8
	Higher Level Education	49	23.9	50.7
	Illiterate	10	4.9	55.6
Valid	Masters	39	19.0	74.6
	PhD	3	1.5	76.1
	Primary Level Education	11	5.4	81.5

School Leaving Certificate	33	16.1	16.1	97.6
Undergraduate	1	.5	.5	98.0
Diploma	4	2.0	2.0	100.0
Total	205	100.0	100.0	

Source: Field Survey 2025

Table 4 shows an overview of the educational qualifications of the respondents' fathers, based on the information provided by 205 participants. It was found that the highest number of fathers possessed a Bachelor's degree, with 55 respondents (26.8%), followed by Higher Level Education, such as +2 or equivalent, with 49 respondents (23.9%). In addition, 39 respondents (19.0%) reported possessing a Master's degree, while 33 respondents (16.1%) reported attaining a School Leaving Certificate (SLC). Some respondents reported possessing Primary Level Education, with 11 respondents (5.4%), while 10 respondents (4.9%) reported being Illiterate. It was found that a small number of respondents reported possessing a PhD, 3 respondents (1.5%), a Diploma, 4 respondents (2.0%), and an Undergraduate without completion, 1 respondent (0.5%). It can be seen that the majority of the fathers reported possessing higher education, while fewer reported possessing limited education.

**Table 5**

*Mother's education*

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelors	55	26.8	26.8	26.8
Higher Level Education	42	20.5	20.5	47.3
Illiterate	27	13.2	13.2	60.5
Masters	18	8.8	8.8	69.3
Valid PhD	1	.5	.5	69.8
Primary Level Education	25	12.2	12.2	82.0
School Leaving Certificate	35	17.1	17.1	99.0
Undergraduate	2	1.0	1.0	100.0
Total	205	100.0	100.0	

Source: Field Survey 2025

Table 5 indicates the educational background of the respondent mothers based on 205 participants. The majority of the respondent mothers had a Bachelor's degree, which was 55 (26.8%) of the mothers. This was then followed by Higher Level Education, where 42 (20.5%) of the respondent mothers had attained this level of education. School Leaving Certificate holders were 17.1% (35) of the respondent mothers, while 25 (12.2%) of them had Primary Level Education. A staggering 13.2% (27) of the respondent mothers were not able to read or write. This was then followed by 18 (8.8%) of the respondent mothers who had a Master's degree. Only 1 (0.5%) of the respondent mothers had a PhD, while 2 (1.0%) of them did not complete an Undergraduate course.

**Table 6**

*Faculty of previous study*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Diploma	44	21.5	21.5	21.5
Management	66	32.2	32.2	53.7
Science	95	46.3	46.3	100.0
Total	205	100.0	100.0	

*Source: Field Survey 2025*

Table 6 shows the distribution of respondents according to their previous faculty of study before joining their current course of study. A total of 205 respondents were considered. Out of these respondents, 95 (46.3%) came from a Science background. Additionally, 66 (32.2%) of the respondents came from a Management stream. Moreover, 44 (21.5%) of the respondents had a Diploma as their previous course of study. This shows that students from different academic backgrounds have joined the current field of study. Science was the most dominant academic background.

**One-Sample Test of Variables**

**Table 7**

*One-Sample Test (Awareness of Green Healthcare)*

Test Value = 3						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
awareness mean	18.680	205	.000	.91463	.8181	1.0112

Table 7 presents one-sample t-test results indicate that the mean awareness score (M = 3.91, calculated as test value 3 + mean difference 0.91) is significantly higher than the neutral midpoint of 3 (t(205) = 18.68, p < .001), with a 95% confidence interval [3.82, 4.01]. This suggests respondents, on average, leaned toward "agree" (since 3.91 falls between 4 = "agree" and 5 = "strongly agree") rather than being neutral. The large effect (mean difference +0.91)

and narrow confidence interval confirm robust evidence that the population's awareness level is meaningfully above neutral, implying favorable awareness outcomes in this sample.

**ANOVA Test of Variables**

**Table 8**

*ANOVA Test (Attitudes mean across faculties)*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.303	2	.151	.611	.544
Within Groups	50.097	203	.248		
Total	50.400	205			

The ANOVA table in Table 8 is used to compare differences in mean attitudes (on a 5-point Likert scale: Strongly Disagree = 1, Strongly Agree = 5) across three or more groups. From the analysis above, there is no significant difference in the attitudes of the respondents across the three or more groups since the result is not significant at .05 since p-value = .544. Moreover, the variation between the groups is small since the sum of squares is only .303 compared to the sum of squares within the groups, which is 50.097. This implies that individual responses to the questions (Strongly Disagree to Strongly Agree) were not systematically influenced by the group membership of the respondents. The result implies that since the p-value is greater than .05, any differences in the mean attitudes of the respondents are probably due to random factors. Thus, the null hypothesis is not rejected since the result is not significant at .05. The null hypothesis is that there is no significant difference in the attitudes of the respondents.

**Correlations Between Practices and Advocacy**

**Table 9**

*Correlations Between Practices and Advocacy*

		practices_mean	advocacy_mean
practices_mean	Pearson Correlation	1	.569**
	Sig. (2-tailed)		.000
	N	205	205
advocacy_mean	Pearson Correlation	.569**	1
	Sig. (2-tailed)	.000	
	N	205	205

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 9 presents the correlation analysis revealed a statistically significant moderate to strong positive relationship ( $r = 0.569$ ,  $p < 0.01$ ) between practices and advocacy among the participants, based on Likert scale responses. This indicates that individuals who reported higher levels of engagement in sustainable healthcare practices also tended to express stronger advocacy for such practices. Since both variables are measured on a Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree), this suggests that as the agreement with sustainable healthcare practices increases, so does the tendency to support or promote them. The finding is based on a sample size of 205 participants and confirms that the association is unlikely to be due to chance.

**Table 10**

*Correlation Between Awareness and Practices*

		awareness_mean	practices_mean
awareness_mean	Pearson Correlation	1	.512**
	Sig. (2-tailed)		.000
	N	205	205
practices_mean	Pearson Correlation	.512**	1
	Sig. (2-tailed)	.000	
	N	205	205

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 10 presents the correlation table shows a statistically significant moderate positive relationship ( $r = 0.512$ ,  $p < 0.01$ ) between awareness and practices regarding sustainable healthcare, based on Likert scale responses (ranging from 1 = strongly disagree to 5 = strongly agree). This indicates that participants who reported higher levels of awareness about sustainable healthcare practices also tended to report higher levels of actual engagement in those practices. With a sample size of 205, the result is reliable and suggests that increasing awareness may be associated with improved sustainable healthcare behaviors among respondents.

## Discussion

The main goal of this analysis was to identify relationships and key findings with respect to students' understanding and adoption of environmentally sustainable practices in healthcare. Several key findings were derived from the analysis of the survey data that are significant with respect to demographic characteristics, awareness, attitudes, practices, and advocacy for college students.

### Awareness of Green Healthcare

The findings from the one-sample t-test analysis showed that the mean for respondents' awareness was significantly higher than the neutral midpoint of 3,  $t(205) = 18.68$ ,  $p < .001$ , with a 95% confidence interval of [3.82, 4.01]. This showed that, on average, respondents were more inclined to agree with the statement with respect to their awareness of green healthcare practices. The significant difference between the mean (0.91) and the narrow confidence interval are strong indicators that the population's awareness level was significantly higher than a neutral stance. This is a positive finding because it indicates that college students in healthcare-related programs have above-average levels of awareness regarding environmental sustainable practices in the field of healthcare. Past studies have also reported that healthcare students have a moderate to high level of awareness regarding environmental issues in clinical practice (Tessema et al., 2025). However, the finding that the mean was 3.91, which is between "agree" and "neutral" rather than "strongly agree," indicates that there is still room for improvement. Educational programs could further increase this level of awareness, especially considering the urgent need for sustainable healthcare in the face of climate change (World Health Organization, 2022).

### **Attitudes Across Faculties**

The ANOVA test used to measure the difference in mean attitude between different faculties of previous studies revealed a complete absence of statistically significant differences between the groups,  $F(2, 203) = 0.611, p = .544$ . This is evident by a small between-groups variation in comparison to the large variation within each group, where Sum of Squares between = 0.303, and Sum of Squares within = 50.097. This indicates a lack of influence of individual variations in attitude due to previous academic faculty.

This indicates a general level of attitude towards environmentally sustainable practices in healthcare services. This could be an indication of a more dominant effect of current educational influences in healthcare studies in comparison to previous academic studies. Martinez & Patel (2020) revealed a similar pattern in their investigation of attitude towards sustainability in healthcare services, where they indicated a greater influence of current curriculum content in comparison to previous academic background. This absence of statistically significant difference could also indicate a general level of attitude towards environmentally sustainable practices in healthcare services, which could be used as a basis for curriculum development without a need to make considerable variations according to previous academic background.

### **Relationship Between Practices and Advocacy**

The correlation analysis revealed that there was a statistically significant moderate to strong positive correlation between practices and advocacy ( $r = 0.569, p < 0.01$ ). This implies that students who have indicated higher levels of engagement in practices related to sustainable healthcare have also indicated higher levels of advocacy for these practices. This finding is consistent with theoretical models of behavioral change that indicate that engaging in a particular behavior strengthens positive attitudes and intentions towards that particular behavior (Ajzen, 1991; Bandura, 1997).

The strength of this correlation is quite high, as indicated by  $r = 0.569$ . This means that 32% of variance is explained by advocacy through practices ( $r^2 = 0.324$ ). The implications of this finding are quite significant, especially in relation to behavioral change, as they indicate that engaging in such practices may also promote advocacy. For example, as they engage in sustainable practices such as reducing waste, conserving resources, and proper disposal of pharmaceuticals, they are likely to advocate for changes within a health care system. This result is consistent with the findings of Roberts & Freeman (2022) that showed that experiential learning for environmental sustainability resulted in increased levels of advocacy for health professions students.

### **Relationship Between Awareness and Practices**

The correlation analysis showed a statistically significant positive relationship between awareness and practices. The correlation analysis showed a statistically significant positive relationship between awareness and practices, as indicated by a correlation value of 0.512 at a p-value of  $< 0.01$ . This shows that there was a positive relationship between awareness levels and actual practices. The positive relationship between awareness levels and actual practices suggests that participants who were more aware of sustainable healthcare practices were also

more likely to engage in such practices. The correlation value of 0.512 shows that 26% of the variance in practices was explained by awareness levels ( $r^2 = 0.262$ ). This result supports the knowledge attitude behavior (KAB) model, which suggests that increased awareness levels lead to behavioral changes ([Bettinghaus, 1986](#)). However, it must also be recognized that the positive relationship between awareness levels and actual practices was only moderate, as indicated by a correlation value of 0.512. This shows that there was a recognized “awareness-behavior gap” or “value-action gap” ([Kollmuss & Agyeman, 2002](#)). Although awareness levels are a necessary precursor to behavioral changes, it is not a sufficient condition for such changes to occur ([Stern, 2000](#)).

The implication of this result is that education should not only aim at creating awareness but should also consider implementation barriers, opportunities for skill development, and a conducive environment for implementation. Similar findings were reported by Jones et al. ([2021](#)) and Walton & Miller ([2019](#)) concerning sustainable healthcare education.

#### **Limitations and Future Directions**

However, there are a few limitations of this study that need to be taken into consideration. Firstly, the majority of participants were females (66.8%), which could affect the generalization of this research to males or non-binary students. Secondly, a survey method was used to collect data for this research, which could lead to social desirability bias, particularly with regards to environmental responsibility behaviors ([Nederhof, 1985](#)). Thirdly, a cross-sectional design was used for this research, which could have affected the findings. Although a correlation between awareness, practice, and advocacy was found, it was not possible to ascertain the nature of this relationship using the findings of this research.

Future studies could use a longitudinal design to explore how awareness, practice, and advocacy change in healthcare education. Further studies could also use a qualitative approach to explore what barriers and facilitators students experience in their efforts to bridge the gap between awareness, practice, and advocacy. Experimental studies could also be conducted to explore how effective different educational interventions could be in changing student awareness, practice, and advocacy.

#### **Conclusion**

The present analysis offers evidence for the above-average awareness of environmentally sustainable practices in healthcare among college students in healthcare-related educational programs, with their mean awareness scores being significantly higher than neutral ( $M = 3.91$ ,  $t(205) = 18.68$ ,  $p < .001$ ). Moreover, there were no significant differences in attitudes towards environmentally sustainable healthcare practices based on students' faculties of study prior to enrollment in their current educational program. This may imply that the current educational program is more important than the past academic background of the students. Notably, moderate to strong positive correlations were found between awareness and practices ( $r = 0.512$ ,  $p < 0.01$ ) and practices and advocacy ( $r = 0.569$ ,  $p < 0.01$ ). The above results highlight the interrelated nature of awareness, practices, and advocacy with respect to environmentally sustainable healthcare practices. Educational interventions targeting all three aspects may be

particularly effective in preparing future healthcare professionals to implement environmentally sustainable healthcare practices.

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