Role of Nurse Managers' Sustainable Management Behaviors in Building Sustainability Consciousness among Nurses

Asmaa Ali Algabar[1], Samar Hosny Ghadery[2], Lobna Khamis Mohamed[3], Rehab Abou Shaheen [4]

[1]Demonstrator of Nursing Administration, Faculty of Nursing, Tanta University, Egypt

[2] Prof. of Nursing Administration, Faculty of Nursing, Tanta University, Egypt.

[3] Prof. of Nursing Administration, Faculty of Nursing, Tanta University, Egypt

[4] Lecturer of Nursing Administration, Faculty of Nursing, Tanta University, Egypt(

Abstract:

Background: Nurse managers' sustainable management behaviors assist nurses in realizing their own capacity to shape their consciousness of sustainable development and have an impact on the global concerns posed by climate change for the expansion and improvement of any healthcare organization. **Aim of the study**: To assess the role of nurse managers' sustainable management behaviors in building sustainability consciousness among nurses. **Research design:** A descriptive-correlational research design was applied. **Subjects**: This study involved all nurse managers (n= 41) and a stratified proportional randomized sampling of nurses (n=286) who were working at Tanta University International Teaching Hospital in all departments and intensive care units. **Tools**: Two tools for data collection were used: the Sustainable Management Behaviors Scale (SMBS) and the Sustainability Consciousness Questionnaire (SCQ). **Results**: Slightly more than sixty percent (65.9%) of nurse managers had a high-level of sustainable management behaviors, and around half (52.1%) of nurses had a high level of sustainability consciousness. **Conclusion**: The current study showed a significant positive statistical correlation between nurse managers' overall sustainable management behaviors and nurses' sustainability consciousness. **Recommendations:** Establish educational programs about sustainable management behaviors to provide nurse managers with needed knowledge and skills, develop green leadership, increase sustainable performance, and create a sustainable nursing workforce.

Key words: Nurse managers, Nurses, Sustainability consciousness, Sustainable development, Sustainable management behaviors.

Introduction

In any healthcare system, hospitals are a crucial but highly expensive resource. The hospital's initial investment and ongoing operating expenses are both expensive.[1] These significant public investments need a good return in the form of effective and worthwhile healthcare services and the creation of a long-lasting, sustainable healthcare system.[2] Most modern healthcare systems are undergoing rapid change as a result of factors like advancing technology, ageing populations, increased patient involvement, and creative ways to deliver care.[1,3]

The sustainability issue in healthcare has gained prominence due to increasing patient influence, increasing specialization, technological innovation, and the requirement to provide care more

effectively.[4] The ability of healthcare systems to fulfil the rising health requirements and expectations of the community through sustainability has been greatly improved by continued scientific and technical advances throughout the 20th century and the early 21st century.[5] Sustainability provides a framework that makes it possible and significantly easier to improve health outcomes and reduce health inequities.[6]

The creation of a sustainable work environment is imperative to protect patient safety, improve nurses' hiring and retention, and keep an organization financially viable.[7] Sustainability in healthcare is the ability to provide healthcare services throughout time while taking future generations into account, with the increasing demand for health services and an already significant financial deficit.[8] The ultimate objective of sustainability in nursing is preserving an environment that does not affect current and future generations' possibilities for good health, which in turn impacts sustainable development (SD).[9]

SD is a development that meets present needs without sacrificing the ability of future generations to meet their own needs. The three fundamental pillars of the SD are the environment, economy, and society. The Environmental SD focuses on preserving biological diversity and sustainable ecological processes.[8] Economic SD advocates for the eradication of poverty and the creation of jobs. In addition to security and good health, social SD places an emphasis on equity among the current and following generations.[10] SD in nursing practice cannot happen in isolation but is dependent on all nurses, nurse managers, and leaders networking, sharing, and collaborating to create genuinely realistic working outcomes.[7,9]

Nursing managers are individuals responsible to upper-level management for carrying out the concept, objectives, and standards of the healthcare organization.[11] These crucial professionals are in charge of supervising groups of nurses that manage a unit or service daily operations, and have a significant impact on the capacity of front-line nurses to innovate and provide high-quality, compassionate, patient care.[12] These experts effectively and efficiently manage the material and human resources required to provide that care. Through the promotion of sound praxis, nurse managers have a significant impact on the management of morally sound actions and cultural builders.[13]

Nursing managers who embrace sustainable management display certain behaviours as adhering to laws and standards, inspecting sustainable practices, and setting strategic performance objectives. [14] Those professionals always focus on proposing various sustainability initiatives, promoting sustainability programmes, guiding project management activities, managing teams, and effectively evaluating sustainable performance, as well as communicating effectively with various departments. [12]

In order to restore and demonstrate that nurses do care and are exceptional at their work, it is crucial to implement a genuine, sustainable nursing management approach for facilitating and supporting frontline nursing personnel to innovate and adapt. [15] The path to nursing excellence could be started by concentrating on the resources needed to foster compassion, and provide excellence in nursing care. [12,15]

Sustainable management is the integration of an internal healthcare organization's

activities with sustainability. It is the formulation, implementation, and assessment of decisions and activities that are both environmentally and socioeconomically sustainable while considering the requirement to safeguard resources so that present and future generations can benefit. [16,17] Sustainable management behaviors include three main aspects; environmental, economic, and social components. Sustainable environmental management behaviors include creating new environmental technology, utilizing renewable energy sources, and conserving the environment. Sustainable economic management behaviors involve maximizing revenues and financial growth while minimizing overall consumption. Socially sustainable management behaviors incorporate citizenship, social reporting, and talent preservation. [16,18]

Many researchers stress that sustainable management behaviors are conveyed in any healthcare organizations through staff members' attitudes, awareness, and consciousness. [8,17.18] Sustainability consciousness (SC) refers to an individual's experience and understanding of SD, including their perceptions linked to ideas, feelings, and behaviours. It is a psychological construct that is symbolised by the categories of knowledge, attitudes, and behaviours in relation to the environmental, economic, and social pillars of SD. [19]

Sustainable knowingness is the cognitive aspect of consciousness that focuses on understanding what is required for SD. On the other hand, sustainable attitudes refer to long-lasting feelings regarding problems with the environment, society, or economy that represent the affective component of SC. [20,21] Whereas, sustainable

management behaviours are a collection of intentional and successful actions that result in the protection of natural and social resources in the environment, economy, and society of SC. [22]

The dimension of environmental SC measures nurses' awareness regarding ecological issues. The dimension of economic SC includes a conscious sense of concern for nurses' long-term financial and personal wellbeing. The third dimension of social SC is the process of building thriving, sustainable environments that foster wellbeing by learning what individuals need from life and work. [19,23]

Significance of study

Egypt's Vision 2030 reflects the long-term strategic plan to achieve the principles and objectives of sustainability in all fields of healthcare, especially in the nursing specialty. It recognized sustainability as a precious domain of quality in the healthcare system that is considered not only in terms of what can be delivered to an individual in the present, but also to the population in general and the patients of the future. [16,17] There is no alternative to investing in a sustainable future. Healthcare systems and communities are damaged by the failure to achieve sustainability objectives. [18,19] Therefore, it is necessary to integrate sustainability management behaviours at all levels in all departments at the same time to change the organizational culture and climate.

According to country trends, assessing the attitudes toward sustainability is an important aspect of nursing practice. Awareness of sustainability and the consequences of unsustainable development can motivate nurses to adopt sustainable practices in the clinical environment and will prepare them for

future challenges. The growth of any organization can be assessed by measuring its ways of attaining sustainability. Thus, the sustainable management behaviors and

Aim of study:

-To assess the role of nurse managers' sustainable management behaviors in building sustainability consciousness among nurses.

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Research Questions:

1. What are the levels of sustainability management behaviors among nurse managers?

2. What are the levels of sustainability consciousness among nurses?

3. What is the relation between the nurse managers' sustainable management behaviours and nurses' sustainability consciousness?

Subjects and Method

Study design:

A descriptive-correlational research design was used in the present study.

Study setting:

The present study was conducted at Tanta University International Teaching Hospital in all departments (General Surgery, Orthopedic, Neurological, Vascular, Cardiothoracic, & Oncology), and all Intensive Care Units (ICUs) (Anaesthesia, Cardiac, Medical, Pediatric, Burn, Kidney, Neonates, & Bone Marrow Transplantation).

Subjects:

The study's subjects consisted of all nurse managers (n=41) and a stratified proportional randomized sampling of nurses in which the stratum was based on the departments. The total number of sample size was 286 who were working in

SC play important roles in the growth and development of any organization; which are needed for environmental, economic, and social development.

the previously mentioned settings. The total study sample was calculated using the Epidemiological Information Microsoft to ensure obtaining an adequate and representative size, where N= population size (1104), Z= confidence level at 95% (1.96), d= margin of error proportion (0.05). The nurses' participants were chosen at random (systematically) every three numbers from a list of names proportional to their numbers in each department.

Tools:

The data of this study was collected through the following two tools:

Tool I: Sustainable Management Behaviors Scale (SMBS): It was developed by **Demirbilek** and **Cetin (2021)** [15] and was adapted by the investigator according to relevant literature reviews. [12, 16] It consisted of two parts involving:

Part 1: Personal data of nurse managers: This part included personal data about nurse managers such as age, sex, marital status, number of children, educational level, years of experience, average income/month, and attending workshops or symposiums related to SD.

Part 2: Sustainable Management Behaviors Questionnaire: It was used to assess the nurse managers' sustainable management behaviors. It consisted of 35 items categorized into four behaviors' subscales involving: corporate functioning (21 items), economic efficiency (5 items), environmental sensitivity (5 items), and protection sensitivity (4 items).

Scoring system: Nurse managers' responses were measured on a 5-point

Likert Scale ranging from strongly agreeing (5) to strongly disagreeing (1). Total score was calculated by summing the scores of all categories, then classified according to the statistical cut-off point for:

- Sustainable management behaviors ≥70%.

-Unsustainable management behaviors <70%.

Tool II: Sustainability Consciousness Questionnaire (SCQ): It was developed by **Gericke, et al. (2019)**[18] and was adapted by the investigator according to relevant literature reviews.[19,20,22] It was consisted of two parts involving:

Part 1: Personal data of nurses: It included personal data about nurses such as age, sex, marital status, number of children, educational level, years of experience, and average income/month.

Part 2: Nurses' Sustainability Consciousness Questionnaire: It was used to assess nurses' SC and consisted of 33 items categorized into nine subdimensions involving: knowingness of environmental sustainability (5 items), knowingness of social sustainability (7 items), knowingness of economic sustainability (3 items), attitudes of environmental sustainability (3 items), attitudes of social sustainability (3 items), attitudes of economic sustainability (3 items), behaviors of environmental sustainability (3 items), behaviors of social sustainability (3 items), behaviors of economic sustainability (3 items).

Scoring system: Nurses' responses were measured on a 5-point Likert Scale ranging from strongly agreeing (5) to strongly disagreeing (1). Total score was categorized according to the statistical cut-off point into:

- High level of SC >75%.

- Moderate level of SC 60% -75%.

- Low level of SC < 60%.

Validity of Study's tools:

The study's tools were submitted to a panel of five experts in the field of nursing administration. The face and content validity values were 88.3% for the Sustainable Management Behaviors Questionnaire and 90.4% for Nurses' Sustainability Consciousness Questionnaire.

Pilot study:

A pilot study was carried out on a sample of 10% of subjects, including five nurse managers and thirty nurses who were excluded from the main study's sample because they worked in different workplaces but had the main key features of the study's sample. It was carried out after the experts' opinions and before starting the actual data collection to test the clarity, items' sequence, applicability, and relevance of questions. The estimated time needed to complete the questionnaire items from nursing staff was 10 – 15 minutes for each sheet (questionnaire).

Reliability of study's tools:

The reliability of tools was tested using the Cronbach Alpha Coefficient test. The reliability values were 0.769 for the Sustainable Management Behaviors questionnaire and 0.816 for the Nurses' Sustainability Consciousness Questionnaire.

Ethical and legal considerations:

Before conducting the study, official permission was obtained from the Dean of Faculty of Nursing and the authoritative personnel of Tanta University International Teaching Hospital, as well as from the Scientific Research Ethics' Committee with code number 47 on March 23, 2022. Nursing staff consents were obtained after being informed about the nature of the

study, their right to withdraw, protection from risk, confidentiality, and privacy of information.

Data collection technique:

The data were collected from nurses by the investigator, who met them in different areas under study during working hours to distribute the questionnaire. The subjects recorded the answer in the presence of the investigator to ascertain that all questions were answered. The data was collected over a period of three months, from the beginning of September 2022 until the end of November 2022.

Statistical analysis:

The collected data were fed to the computer using IBM SPSS software package version 20.0 (Armonk, NY: IBM Corp.). The questionnaire was analyzed for internal consistency using the Cronbach Alpha coefficient test. Qualitative data were described using numbers and percents. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to verify the distribution normality for quantitative data, which was described using range, mean, standard deviation, and median .

The Chi-Square test was used for the categorical variables to compare different groups, while the Monte Carlo test was used for correlation of the Chi-Square when more than 20% of the cells that have an expected count less than 5%. The correlation was calculated using Pearson's correlation coefficient. A regression test was used to detect the most independent factor affecting nurses' SC. The level of significant was adopted at $p \leq 0.05$.

Results

Table 1 shows the frequency and distribution of nurse managers' personal data. It was observed that 61% of nurse managers worked in ICUs, while 39% of them worked in departments. Around half

(48.8%) of nurse managers were aged 40 to more than 50, with a mean of 44.37±6.49. All nurse managers were female, 97.6% of them were married, and 73.2% of them had three or more than three children, with a mean of 2.83±0.74. Additionally, the highest percent (65.9%) of nurse managers had a Bachelor of Science in Nursing, and 56.1% of them had more than 20 years of experience with a mean of 21.34±6.61. Around three quarters (73.2%) of them had an average income per month greater than 4000 EGP, and the majority (82.9%) of them had attended workshops or symposiums related to SD.

Table 2 demonstrates the frequency and distribution of nurses' personal data. It was observed that 67.4% of nurses worked in ICUs, while 32.3% of them worked in departments. More than half (51.7%) of nurses aged between 20-<30 with a mean score of 31.79±7.79, and 87.1% of them were female. The majority (88.8%) of them were married, and 67.5% of them had less than three children, with a mean score of 1.94±1.24. Additionally, 68.5% of nurses graduated from Technical Nursing Institute, and 83.9% of them had less than or equal to 20 years of experience, with a mean score of 10.75±8.56. Also, 85.3% of nurses received from 2000 EGP to 4000 EGP as their average income/month.

Table 3 represents the nurse managers' mean percent scores on the dimensions of sustainable management behaviors. It was noticed that the corporate functioning behaviors was ranked as having the highest mean percent score (80.40±10.84) followed by the economic efficiency behaviors (80.24±9.15), then the protection sensitivity behaviors (77.90±12.35). While the environmental sensitivity behaviors were ranked as

having the lowest mean percent score (46.83±15.92). The overall percent mean score of sustainable management behaviors was 75.30±9.79.

Figure 1 describes the levels of sustainable management behaviors as perceived by nurse managers. This figure reveals that 95.1%, 80.5% and 70.7% of nurse managers had sustainable management behaviors in economic efficiency, corporate functioning, and protection sensitivity, respectively. While 82.9% of nurse managers had unstainable management behaviors in environmental sensitivity. Overall, slightly more than sixty percent of nurse managers had sustainable management behaviors.

Table 4 demonstrates the nurses' overall mean percent scores of sustainability consciousness dimensions. The overall attitudes of SC were ranked as the highest with a mean percent score of 85.51±9.68, followed by the overall knowingness of SC with a mean percent score of 83.88±7.97, and finally, the behaviors of SC with a mean percent score of 55.64±13.72. The overall nurses' SC mean percent score was 76.62 ± 7.95.

Figure 2 represents levels of nurses' sustainability consciousness dimensions. The majorities (82.5% and 80.4%) of nurses had a high level of attitudes and knowingness of SC, respectively. Whereas more than two-thirds (71.3%) of nurses had a low level of SC behaviors. Overall, 52.1% of nurses had a high level of SC, 47.2% had a moderate level, and only 0.7% had a low level.

Table 5 represents the relations between nurse managers' personal data and levels of sustainable management behaviors. No statistically significant difference was found between nurse managers' personal data and their overall levels of sustainable management behaviors except for their age (χ^2=6.563, p=0.042) and their average income per month (χ^2=7.795, p=0.007).

Table 6 shows the relations between nurses' personal data and their levels of sustainability consciousness. No statistically significant difference was found between nurses' personal data and their SC except for their age (χ^2=12.217, p=0.035), and their years of experience (χ^2=9.595, p=0.007).

Table 7 represents the correlations between nurse managers' sustainable management behaviors and nurses' sustainability consciousness. The table declares significant positive statistical correlations between nurse managers' overall sustainable management behaviors and dimensions of nurses' SC.

Table 8 denotes the univariate linear regression between nurse managers' sustainable management behaviors and nurses' sustainability consciousness. The goal of this table was to observe how the overall score of nurse managers' sustainable management behaviors affected the overall score of nurses' SC. The overall score of nurse managers' sustainable management behaviors was found to significantly contribute to the prediction of the explained variance of SC with a regression coefficient value (r^2 = 0.041), F test (f = 12.249) at highly significant level of p = 0.001.

Table (1): Frequency and distribution of nurse managers' personal data (n = 41)

Personal data of nurse managers		No. (n = 41)	%
Departments' name	Departments*	16	**39.0**
	ICUs*	25	**61.0**
Age	30-<40	10	24.4
	40-<50	20	**48.8**
	≥50	11	26.8
Min. – Max.		30.0 – 57.0	
Mean ± SD.		**44.37 ± 6.49**	
Median		45.0	
Sex	Male	0	0.0
	Female	41	**100.0**
Marital status	Married	40	**97.6**
	Unmarried	1	2.4
Number of children	<3	11	26.8
	≥3	30	**73.2**
Min. – Max.		1.0 – 4.0	
Mean ± SD.		**2.83 ± 0.74**	
Median		3.0	
Educational level	Bachelor of Science in Nursing	27	**65.9**
	Postgraduate studies *	14	34.1
Years of experience	≤20	18	43.9
	>20	23	**56.1**
Min. – Max.		8.0 – 34.0	
Mean ± SD.		**21.34 ± 6.61**	
Median		22.0	
Average income/month	2000 EGP to 4000 EGP	11	26.8
	More than 4000 EGP	30	**73.2**
Have you attended any workshops or symposiums related to SD?	Yes	34	**82.9**
	No	7	17.1

***Departments** of general surgery, orthopedic, neurological, vascular, cardiothoracic, and oncology
***ICUs** of anesthesia, cardiac, medical, pediatric, burn, kidney, neonates, and bone marrow transplantation
***Postgraduate studies** of diploma or master degrees

Table (2): Frequency and distribution of nurses' personal data (n = 286)

Personal data of nurses		No. (n= 286)	%
Departments' name	General surgery	17	5.9
	Orthopedic department	15	5.2
	Neurological department	15	5.2
	Vascular department	14	4.9
	Cardiothoracic department	15	5.2
	Oncology department	17	5.9
	Anesthesia ICU	24	8.4
	Cardiac ICU	26	9.1
	Medical ICU	25	8.7
	Pediatric ICU	25	8.7
	Burn ICU	24	8.4
	Kidney ICU	23	8.0
	Neonates ICU	24	8.4
	Bone Marrow transplantation ICU	22	7.7
Age	20-<30	148	51.7
	30-<40	82	28.7
	40-<50	45	15.7
	≥50	11	3.8
Min. – Max. Mean ± SD. Median		21.0 – 58.0 31.79 ± 7.79 29.0	
Sex	Male	37	12.9
	Female	249	87.1
Marital status	Married	254	88.8
	Unmarried	32	11.2
Number of children	<3	193	67.5
	≥3	93	32.5
Min. – Max. Mean ± SD. Median		0.0 – 6.0 1.94 ± 1.24 2.0	
Educational level	Secondary Nursing Diploma	53	18.5
	Technical Nursing Institute	196	68.5
	Bachelor of Science in Nursing	34	11.9
	Postgraduate studies *	3	1.0
Years of experience	≤20	240	83.9
	>20	46	16.1
Min. – Max. Mean ± SD. Median		1.0 – 39.0 10.75 ± 8.56 8.0	
Average income/month	Less than 2000 EGP	8	2.8
	From 2000 EGP to 4000 EGP	244	85.3
	More than 4000 EGP	34	11.9

*Postgraduate studies (of diploma or master degrees

Table (3): Nurse managers' mean percent scores on the dimensions of sustainable management behaviors (n = 41)

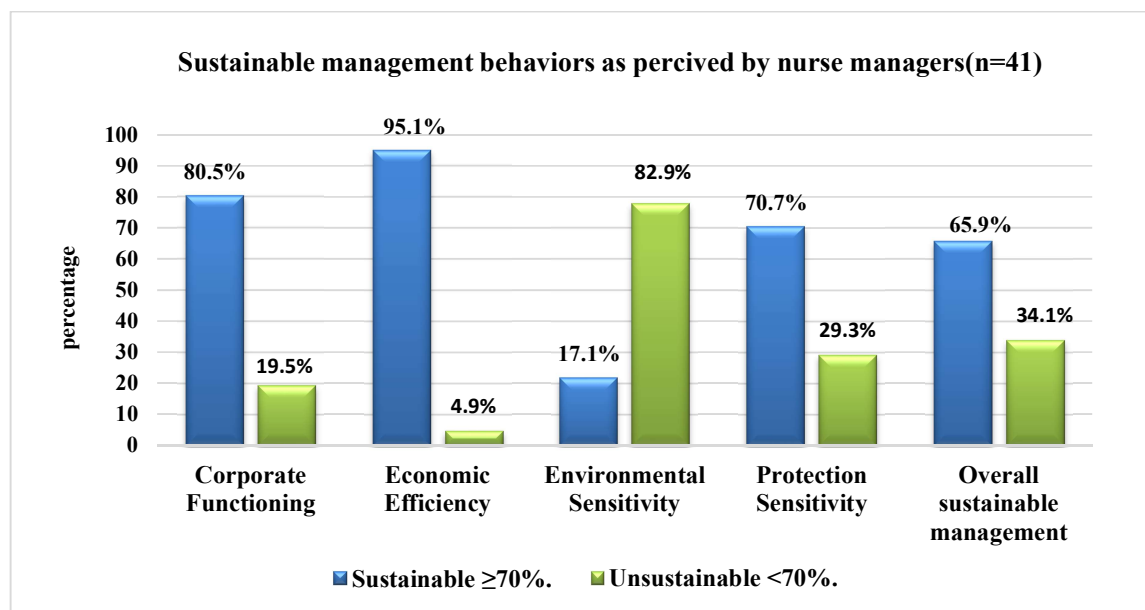| Sustainable management behaviors	Min. – Max.	Mean ± SD.	Median	Mean percent Score
Corporate Functioning Behaviors	72.0 – 105.0	88.54 ± 9.11	88.0	**80.40 ± 10.84**
Economic Efficiency Behaviors	18.0 – 25.0	21.05 ± 1.83	21.0	**80.24 ± 9.15**
Environmental Sensitivity Behaviors	10.0 – 22.0	14.37 ± 3.18	13.0	**46.83 ± 15.92**
Protection Sensitivity Behaviors	13.0 – 20.0	16.46 ± 1.98	17.0	**77.90 ± 12.35**
Overall sustainable management behaviors	120.0 – 171.0	140.4 ± 13.24	141.0	**75.30 ± 9.79**

Figure (1): Levels of sustainable management behaviors as perceived by nurse managers

Table (4): Nurses' overall mean percent scores of sustainability consciousness dimensions (n = 286)

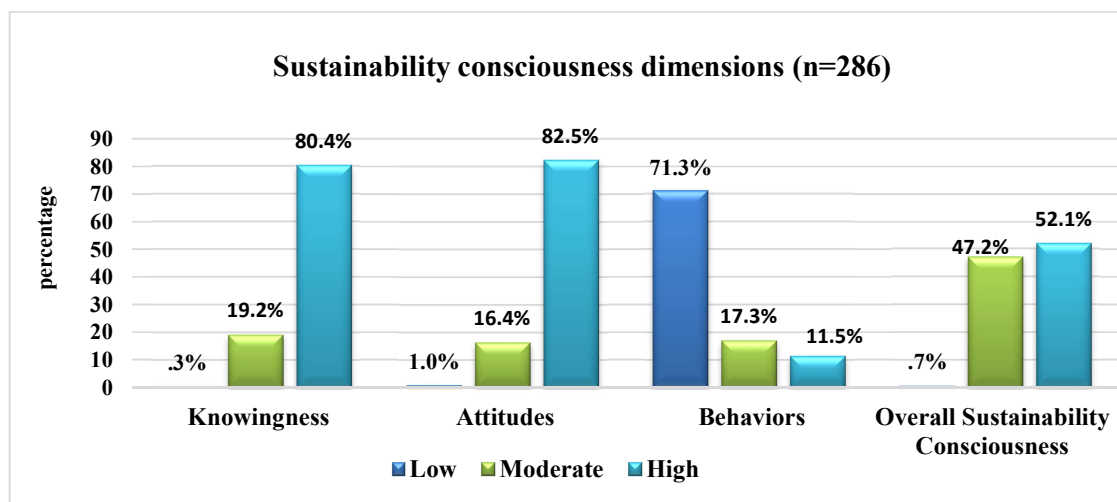| Nurses' Sustainability Consciousness	Min. – Max.	Mean ± SD.	Median	Mean percent Score
Knowingness of Environmental Sustainability	11.0 – 25.0	21.57 ± 2.58	22.0	82.87 ± 12.89
Knowingness of Social Sustainability	25.0 – 35.0	32.49 ± 2.08	33.0	91.03 ± 7.42
Knowingness of Economic Sustainability	7.00 – 15.00	11.27 ± 1.87	11.00	68.88 ± 15.55
Overall Knowingness	49.00 – 75.00	65.33 ± 4.78	66.00	**83.88 ± 7.97**
Attitudes of Environmental Sustainability	7.0 – 15.0	13.42 ± 1.48	14.0	86.80 ± 12.37
Attitudes of Social Sustainability	7.0 – 15.0	12.44 ± 1.84	12.0	78.64 ± 15.31
Attitudes of Economic Sustainability	9.0 – 15.0	13.93 ± 1.22	14.0	91.08 ± 10.20
Overall Attitudes	29.0 – 45.0	39.78 ± 3.49	40.0	**85.51 ± 9.68**
Behaviors of Environmental Sustainability	4.00 – 15.00	8.66 ± 2.01	9.0	47.20 ± 16.74
Behaviors of Social Sustainability	6.0 – 15.0	11.77 ± 2.28	12.0	73.11 ± 18.99
Behaviors of Economic Sustainability	4.0 – 15.0	8.59 ± 2.35	9.0	46.62 ± 19.55
Overall Behaviors	18.0 – 45.0	29.03 ± 4.94	28.0	**55.64 ± 13.72**
Overall nurses' sustainability consciousness	105.0 – 165.0	134.1±10.50	133.0	**76.62 ± 7.95**

SD: **Standard deviation**

Figure (2): Levels of nurses' sustainability consciousness dimensions (n = 286

Table (5): Relations between nurse managers' personal data and levels of sustainable management behaviors (n = 41)

Personal data of nurse managers	Level of overall management behaviors				χ^2	p
	Unsustainable (n =14)		Sustainable (n =27)			
	No.	%	No.	%		
Departments' name						
Departments	5	35.7	11	40.7	0.098	0.754
ICUs	9	64.3	16	59.3		
Age						
30-<40	1	7.1	9	33.3		
40-<50	6	42.9	14	51.9	6.563[*]	^{MC}p=**0.042***
≥50	7	50.0	4	14.8		
Sex						
Male	0	0.0	0	0.0		
Female	14	100.0	27	100.0	–	–
Marital status						
Married	14	100.0	26	96.3	0.531	^{FE}p=1.000
Unmarried	0	0.0	1	3.7		
Number of children						
<3	2	14.3	9	33.3	1.704	^{FE}p=0.275
≥3	12	85.7	18	66.7		
Educational level						
Bachelor of Science in Nursing	10	71.4	17	63.0	0.294	^{MC}p=0.734
Postgraduate studies	4	28.6	10	37.0		
Years of experience						
≤20	6	42.9	12	44.4	0.009	0.923
>20	8	57.1	15	55.6		
Average income/month						
2000 EGP to 4000 EGP	0	0.0	11	40.7	7.795*	FEp=**0.007***
More than 4000 EGP	14	100.0	16	59.3		
Have you attended any workshops or symposiums related to SD?						
Yes	13	92.9	21	77.8	1.481	^{FE}p=0.389
No	1	7.1	6	22.2		

Table (6): Relations between nurses' personal data and their levels of sustainability consciousness (n = 286)

Personal data of nurses	Overall, Nurses' Sustainability Consciousness						χ^2	^{MC}p
	Low (n = 2)		Moderate (n =135)		High (n =149)			
	No.	%	No.	%	No.	%		
Departments' name								
Departments	1	50.0	57	42.2	78	52.3	3.151	0.147
ICUs	1	50.0	78	57.8	71	47.7		
Age								
20-<30	1	50.0	81	60.0	66	44.3		
30-<40	0	0.0	33	24.4	49	32.9	12.217*	**0.035***
40-<50	1	50.0	19	14.1	25	16.8		
≥50	0	0.0	2	1.5	9	6.0		
Sex								
Male	1	50.0	17	12.6	19	12.8	2.631	0.328
Female	1	50.0	118	87.4	130	87.2		
Marital status								
Married	2	100.0	121	89.6	131	87.9	0.478	0.770
Unmarried	0	0.0	14	10.4	18	12.1		
Number of children								
<3	1	50.0	99	73.3	93	62.4	4.473	0.076
≥3	1	50.0	36	26.7	56	37.6		
Educational level:								
Secondary Nursing Diploma	1	50.0	23	17.0	29	19.5		
Technical Nursing Institute	1	50.0	93	68.9	102	68.5	7.421	0.357
Bachelor of Science in Nursing	0	0.0	19	14.1	15	10.1		
Postgraduate studies	0	0.0	0	0.0	3	2.0		
Years of experience								
≤20	1	50.0	122	90.4	117	78.5	9.595*	**0.007***
>20	1	50.0	13	9.6	32	21.5		
Average income/month								
Less than 2000 EGP	0	0.0	4	3.0	4	2.7		
From 2000 EGP to 4000 EGP	1	50.0	117	86.7	126	84.6	4.452	0.391
More than 4000 EGP	1	50.0	14	10.4	19	12.8		

Table (7): Correlations between nurse managers' sustainable management behaviors and nurses' sustainability consciousness (n = 286)

Dimensions of sustainability consciousness	Overall sustainable management behaviors	
	R	P
Knowingness of sustainability consciousness	0.142	0.016*
Attitudes of sustainability consciousness	0.133	0.025*
Behaviors of sustainability consciousness	0.201	0.00*
Overall nurses' sustainability consciousness	0.203	0.001*

r: Pearson coefficient, *: Statistically significant at $p \leq 0.05$

Table (8): Univariate Linear Regression between nurse managers' sustainable management behaviors and nurses' sustainability consciousness

Study's variables	B	Beta	t	P	(LL – UL 95%C. I)
Sustainability Consciousness	62.542		15.442*	<0.001*	54.570 – 70.513
Sustainable management behaviors	0.187	0.203	3.500*	0.001*	(0.082 – 0.293)
$R^2 = 0.041$, F = 12.249*, p = 0.001*					

Consciousness = 62.542 + (Sustainable management behaviors*0.187)
R^2: Coefficient of determination, B: Unstandardized Coefficients, Beta: Standardized Coefficients, t: t-test of significance, CI: Confidence interval, LL: Lower limit, and UL: Upper Limit.

Discussion

Healthcare is one of the difficult industries that need sophisticated requirements and effective recruitment techniques, yet it is very hard to choose competent professionals and maintain a sustainable management environment over time. [23] Nurse managers are of great importance in the management of ethically green management behaviors through the strengthening of good praxis. [13]

Achieving sustainable management behaviors in healthcare organizations needs both individual and collective changes concerning all health service practices and obligates nurses to increase their awareness of sustainable consciousness. [13] The nurse managers' sustainable management behaviors effectively encourage nurses' participation to enhance nursing practices in their own workplaces and assist nurses in realising their own capacity to influence SD consciousness. [10]

Nurse managers' sustainable management behaviors

The present study's results showed a high overall percent mean score of sustainable management behavior. Moreover, around two-thirds of nurse managers reported that they sustained their management behaviors. This study's results may be

interpreted by that the majority of nurse managers attend workshops or symposiums related to SD, and more than half of them have more than 20 years of experience. In addition, the nurse managers believe that their behaviors are crucial for working sustainably because everyone has a shared responsibility and commitment to protect the environment and their patients. Moreover, all the participants in this study are female, who are more likely to be green than men and have the ability to be more sustainable due to personality differences.

Along with the present study findings, **Sorour** and **Elkholy (2021)** [24] assured that the majority of the participants had a moderate level of SD behaviors in different categories among nursing staff. On the same scene, **Abd-Elmonem, et al. (2022)** [25] indicated that about two-thirds of nurse managers had a high perception level towards green human resource management to support the sustainable use of resources and preserve the natural environment in which the hospital provided training programs to develop green leadership approaches for leaders to implement green sustainable management strategies.

Additionally, **Fleiszer, et al. (2016)** [26] confirmed that managing sustainability in nursing is a complex mission as the unit nurse leaders must strategically coordinate numerous overlapping and synergistic activities to achieve long-term benefits. Likewise, **Salmela, et al. (2016)** [27] displayed that nurse managers had a great role in creating an atmosphere of ethical sustainable culture with good transitions for practice in routine care.

On the other side, the present study's findings are incongruent with **Leppanen, et al. (2022)** [28] who revealed a poor level of SD principles among nurse managers. Nurse managers considered their chances to influence decision-making reduced by their limited economic knowledge, and restricted ecological viewpoints

Nurses' sustainability consciousness:

The study's data analysis indicated that more than half of the studied nurses had a high level of SC. This result may be explained by the fact that they have a sufficient professional body of knowledge, behaviors, and attitudes regarding the prevention of illness and promotion of health, which provide them with a sense of special responsibility towards their patients in particular and their community generally, which consequently contributes to SD.

This finding is supported by the study of **Alvarez-Nieto, et al. (2022)** [29] who found that participants had an awareness of SD as a chance for transferring sustainability principles from their personal to their professional lives. Furthermore, **Dossey, et al. (2019)** [30], **Kitt-Lewis, et al. (2020)** [31] and **Kurth (2017)** [32] emphasized the importance of increasing awareness of the sustainable development goals (SDGs) within nursing in various categories of healthcare providers.

In this aspect**, Benton, et al. (2020)** [33] confirmed that the nursing profession is well-positioned to have an impact on the SDGs due to the reach of its influence and care, including those with the largest health disparities and from the most remote regions. While**, Fields** and **Cunningham – Williams (2021)** [34] demonstrated that nursing may be falling short of its capacity to impact the SDGs due to concerns of lacking sustainable consciousness, inadequate research on the

SDGs, and shortages in the number and quality of nurses.

In contrast to this result, **Ovais (2023)** [35] illustrated that the nursing students had a low level of SC, which emphasized the necessary to increase consciousness of the advantages and risks of sustainability. **Taie (2022)** [36] observed a poor knowledge of SD principles among perioperative nurses that was justified due to high-quality models of patient care but did not include elements of SD. **Fields** and **Cunningham-Williams (2021)** [34] implied that nurses were not aware of many of the goals or even aware of the existence of the SDGs.

Relations and correlations between dimensions of nurse managers' sustainable management behaviors and domains of nurses' SC.

The current study's results displayed statistically significant relations between overall sustainable management behaviors and nurse managers' age and average income per month. It is inferred from these findings that the studied nurse managers are older and mature enough to be more visionary, expert, knowledgeable, competent, and active, who in turn will be able to adopt sustainable management behaviors in their nursing practices such as setting long-term developmental goals, clarifying potential uncertainties, meeting nurses' needs, and encouraging nurses to remove all resource-wasting practices. Moreover, the nurse managers' adequate salaries serve as motivators to perform their roles well due to their sense of responsibility, job satisfaction, moral stability, and commitment to sustain their organization.

These findings of the current study are supported by **Surzykiewicz, et al.**

(2019) [37] and **Zhang, et al. (2017)** [38], who also confirmed that as head nurses got older, they interacted with the environment more sustainably, which results in more effective management behaviours and improves their capacity to sustainably lead their staff. Furthermore, this study's finding is on agreement with the study of **Wang, et al. (2019)** [39] who discovered that salaries of nurse managers that were weak, did not motivate them to be sustainable leaders.

The outcomes of this study also showed statistically significant relations between overall nurses' SC and their age, and years of experience. These results indicated that younger nurses with less experience are more flexible and adaptable to change than older nurses, as well as having more contact with social media and TV advertisements, all of which have recently tended to emphasize the importance of sustainability.

The study's result of **Johnstone** and **Lindh (2018)** [40] supported this finding and demonstrated a positive relationship between sustainability awareness age and younger participants. While, **Wang, et al. (2022)** [41] discovered that experienced nurses with more years of experience were more likely to have highly and moderately relevant sustainable transformational roles.

The data analysis of the present study showed a significant positive statistical correlation between nurse managers' overall sustainable management behaviors and nurses' SC. It demonstrated a significant contribution of nurse managers' sustainable management behaviors to nurses' SC with a regression coefficient value at a highly significant level.

This study result may be interpreted by the fact that nurse managers try to act as

directors for their nurses in adopting sustainable management and impacting their nursing staff for sustainable initiatives within their organizations. In addition, this finding can be explained as a growing sense of nurse managers' responsibility towards promoting green practices that are essential for limiting the consequences of climate change, increasing nurses' consciousness of sustainability, which is thought to be a pathway towards adopting sustainable nursing practices.

On agreement with this finding, **Al-Dweik, et al. (2016)** [42] found that nurse leaders' management behaviors had a positive effect on staff nurses' perceptions. **Demirbilek** and **Cetin (2021)** [15] study's finding mentioned that managers who adopt sustainable management behaviors acted on raising staff awareness about sustainability initiatives and leading teams that implement them. **Bianchi, et al. (2018)** [43] and **Maibach, et al. (2021)** [44] confirmed that nursing management can intentionally support awareness building to enhance nursing practice so that it is in arrangement with a healthy planet.

In this scene, **Peterlin, et al. (2015)** [45] stated that servant and sustainable leadership as contemporary leaders encouraged sustainability at individual, organizational and social levels, as well as emphasizing the individualized influence on current followers and the future needs of generations to come. **Wang, et al. (2022)** [41] showed that nurse leadership is an observable set of practices with the need and persistence to make a difference that can substantially improve nurses' abilities.

Furthermore**, Sorour** and **Elkholy (2021)** [24] showed highly significant positive

statistical correlations between the role of nursing servant leadership and staff nurses' creativity and SD behaviors. **Iqbal** and **Ahmad (2021)** [46] concluded their study with a framework of SD, which displayed the vital role of sustainable leaders in increasing awareness and promoting the engagement of their subordinates towards SD. **Gong, et al. (2021)** [47] showed a positive association between nurses' intentions to practice green behaviour and their actual green behaviour, with the relationship being higher in organizations with high ethical leadership than in those with low ethical leadership.

Conclusion

The current study's findings confirm that more than sixty percent of nurse managers had sustainable management behaviors regarding overall dimensions, as well as more than half of the studied nurses had a high level of SC. Furthermore, no statistically significant difference was found between all items of nurse managers' personal data and their overall management behaviors except for their age and average income per month. There wasn't a statistically significant difference between nurses' personal data and their overall SC except for their age, and years of experience. There was a significant positive statistical correlation between nurse managers' overall sustainable management behaviors and nurses' SC.

Recommendations:

The findings of the present study directed to recommend the following:

For the hospital administration

- Develop policies and strategies that promote nursing staff's sustainable competences, and link rewards and compensation with nursing staff sustainability management practices.

- Establish educational training programs about sustainable management behaviors to provide nurse managers with needed knowledge and skills, develop green leadership, increase sustainable performance, and create a sustainable nursing workforce.
- Build a sustainability development work environment to promote nursing staff's competences in contributing to healthcare desired outcomes through paying concentration to green attraction and polarization, in light of incorporating sustainable procedures into the job description and performance evaluation process.
- Incorporate sustainability pillars into management and control systems as sustainability is a compliant aim with current economic environmental global challenges.
- Conduct experiential and mentorship programs for meeting the sustainable management skills of nurses before the assumption of managerial positions.
- Conduct periodical workshops or symposiums and continuous training programs to improve nurses' SC and to develop green leadership methods for improving outcomes.

For Nurse managers

- Rewarding staff and providing them with feedback are excellent ways to inspire them to take on sustainability responsibility.
- Encourage their nurses in the institution to conduct research regarding sustainability and to transform research results into practice, and to take responsibility in this regard.
- Empower nurses' access to chances, information, training, and facilities,

regarding SD, all of which undoubtedly increase their SC.
- Integrate care of the sustainable natural environment in daily practice and decisions in healthcare system to successfully meet the practice obligations, while contributing to meeting SDGs.
- Conduct regular in-service educational programs once monthly with nurses to foster their SC.

For nursing Education

- Incorporate environmental concerns and sustainability in healthcare within the nursing curriculum to apply their professional role in SD.
- Offer opportunities for nursing students to participate in environment-related extracurricular activities.
- Establishment of an educational program to raise the awareness of nursing students and educators about SD to instil a culture of sustainability in nursing.

For nursing research

- Conduct further nursing research can be handled to identify the nature of relationship between sustainable management behaviors, climate change, and patients' outcomes.
- Perform further qualitative research to increase efforts and add to the evidence base documenting progress and challenges in meeting the SDGs.
- Emphasize future research to study the relations between sustainable management and SC and patient outcomes.

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