

Green Artificial Intelligence: A Study with reference to Medical Institutions in India

Dr.Mallika D. S¹, Dr.Asha. B.G², Lokesh. Y.R³,

¹Associate Professor, Seshadripuram College, Bengaluru

EmailID: dsmallika.achar@gmail.com

²Assistant Professor, Government First Grade College, Sringeri

EmailID: bgasha23@gmail.com

³Assistant Professor, Ramaiah Institute of Management Studies (RIMS), Gokula, Bangalore

EmailID: lokesh@rimsbangalore.in

ABSTRACT

This research investigates the knowledge, adoption, advantages, challenges and organizational preparedness for Green Artificial Intelligence (Green AI) in healthcare agencies of Bengaluru. Considering India's sustainability objectives and increased energy consumption to execute AI, it is important to explore Green AI in the context of healthcare. Applying a mixed-methods design, 212 responses from 24 institutions were collected and analyzed. The results show middle to high aware-ness, and positive movement in green IT practices and policy integration. Green AI is good and for the masses, considering its PR points and eco-guiding. The main obstacles include lack of management support, shortage of funds, and technical skills deficiencies. There were no clear public/private or large/small differences, indicating equally readiness across these types of schools. Yet, though we did find a statistically significant positive relationship between institutional elements and adoption, over 99% of the adoption variance is left unexplained, signalling the existence of additional (non-measured) drivers. The report highlights the importance of further investigation on these hidden correlate

Keywords: Green AI, Artificial Intelligence, Healthcare, Sustainability, India, Awareness, Adoption, Readiness, Challenges

INTRODUCTION:

The promise of AI in healthcare can increasingly be seen in diagnostic, personalized treatment, patient monitoring, and administrative use cases. AI-aided-technologies are usefully applied to early diagnosis of diseases as cancer and diabetic retinopathy, scheduling of management; reduction of human mistakes as well as to providing clinical decision support (Jiang et al., 2017; Topol, 2019). In India, digital health initiatives, rising patient demand, and pressure to cater to the unmet healthcare needs in remote areas has been forcing healthcare to adopt AI (NITI Aayog, 2021; Ministry of Health and Family Welfare, 2020). Yet with all of this progress has come growing concern about the environmental price of AI systems, and particularly those based on power-intensive deep learning models.

As the use of AI booms worldwide, so does its carbon footprint. Research shows that emissions from training a single deep learning model are as high as 5 times the lifetime emissions of an average car (Strubell used to train something like a new model of a machine learning model (Kalchbrenner et al. This has given rise to a burgeoning area called Green Artificial Intelligence (Green AI), which studies energy- efficient and environmentally friendly AI learning models and systems (Schwartz et al., 2020). Green AI proponents call for efficiency gains to be achieved such as through computational resources, adoption of hardware with low power requirements, and the greening of AI's lifecycle to ensure that only

environmentally friendly practices and products are adopted.

This is especially true for Indian healthcare for which sustainable digital solutions are in desperate need. As medical records become more digitized, AI-aided diagnostics, and telemedicine are surfacing on the map, medical institutions' (computational) infrastructure will have to grow scaling operations for the long-term. With India's commitment to the United Nations SDGs, its commitment for net-zero carbon emissions by 2070, and the rising general awareness of climate change, growing attention should be paid to green technology innovations (Government of India, 2021). But a disconnect remains between the AI revolution in health and broader sustainability ambitions.

At present, very few Indian hospitals are tracking or attempting to restrain the environmental fallout of AI. On the healthcare front, Raghavan and Deshmukh (2021) found that most AI deployment in the Indian healthcare context is based on western infrastructure with minimal considerations of localization for the low resource, high demands setting. Another thing is that, the two, mentioned above, are silent on the issue of environmental sustainability which is also essential to bring into the apex cyber system of the country (Mukherjee, 2022).

A significant barrier is the differential status of public and private hospitals in AI and Readiness Infrastructure and sustainability of practice. In urban India, big private hospitals are investing in cutting-edge AI, while funding

as well as skilled staff is lacking in the smaller public institutions (Jain & Sharma, 2023). These institutional differences may shape what is possible, how quickly and whether these can be sustained in the long run contributing to an uneven digital health landscape.

With the Indian healthcare system increasingly focussing on digital transformation of the ecosystem, there is a necessity to research the adoption and implementation of Green AI principles in the Indian health system. This gap inspires us to investigate the way Green AI is understood in the literature and beyond (i.e., educational and research). Using mixed research research and fusing both qualitative and quantitative data analysis, this research contributes in the empirical dialogue for sustainable AI adoption in EMs and also relate to the healthcare sustainability in India context.

Conceptual Framework

1. Green Artificial Intelligence (Green AI): Green AI aims to develop AI systems that leverage technology with environmental concerns in mind, therefore lowering energy usage and carbon footprint. In health-care industry, where large body of AI ML driven applications such as health care diagnosis and patient monitoring require intensive resources, Green AI provides a solution to minimize the ecological foot-print, which can be equivalent to that of a resource geosensitive countries like India (Schwartz et al., 2020; Strubell et al., 2019).

2. The Digitalisation of Healthcare in India: AI driven services are holding India's mettle in healthcare digitisation, with the likes of the National Digital Health Mission (NDHM). Yet, as digitalization escalates, it will lead to higher energy needs, making it imperative to integrate sustainability in to digital healthcare strategies (Mukherjee, 2022; Chatterjee & Rana, 2022).

3. Sustainability and the Environment: AI-based health care has substantial environmental costs with regards to electricity, hardware emissions, and cooling requisites. Green AI does to alleviate such problems by encouraging energy-efficient algorithms and infrastructure, providing much needed 'healthcare progress' while being consistent with India's environmental obligations under Nationally Determined Contributions (NDCs) (Mishra & Rao, 2022).

4. Institution Readiness: Institution readiness includes infrastructure and fund, human resource and policy support that is needed for Green AI adoption. Private institutions might be in a better position than public ones, even though needing to work on national frameworks, the NITI Aayog's "Responsible AI for All," to have a sustainable integration (Jain & Sharma, 2023; Aggarwal & Joshi, 2021).

2. Review of Literature

2.1 Green Artificial Intelligence (Green AI) by Name and Nature

Green Artificial Intelligence (Green AI) is a novel R&D discipline which brings sustainability concerns, and a focus on ethical and efficient computing to AI and machine learning (ML). Introduced by Schwartz et al. (2020), it works toward AI models that are more

computationally affordable and eco-friendly, and thus challenges the hegemonic performance-focused paradigm of AI which often turns a blind eye to the costs in terms of energy consumption and carbon emission.

As per Mishra and Rao (2022), Green AI is the process of incorporating sustainable design practices throughout the life cycle of AI models starting from their development and training to their deployment and maintenance. The authors assert that Green AI is especially important for countries such as India, which are resource-starved, and where technology expansion needs to be in conjunction with sustainable environment.

2.2.1 Healthcare - AI Applications

Indeed, AI is transforming the healthcare sector, and technical applications range from predictive diagnostic systems, to robot-assisted surgery, and clinical decision-support systems, to remote monitoring (Topol, 2019). These advances are increasing automation, decreasing human error and advancing the concept of personalised drugs. But the environmental impact of such technologies has not been well studied.

Adgarwal and Joshi (2021) mentioned that AI systems are being deployed in the Indian hospitals more and more using radiology, pathology and patient triaging AI tools. However, little is known about the energy efficiency of these systems or their overall environmental lifecycle impact.

2.3 Environmental implications of AI systems:

Enormous computational power is required in AI systems and deep learning models, which are consumptive of electricity and consequently increase carbon emissions. Strubell, Ganesh, and McCallum observed that training one NLP model can lead to the emission of over 626,000 pounds of CO₂, which is equivalent to five cars lifetime emissions. Raghavan and Deshmukh states that healthcare AI in India is mostly imported from Western models with less concern given to building low-energy models. This holds that AI models only focus on producing accurate results with less consideration given on how much electricity is consumed. More specifically, these authors argue in favor of locally optimized AI models that use edge computing and lightweight AI models that strike a balance between performance and sustainability.

2.4 Institutional readiness and Green AI Adoption in India:

Institutional readiness is a critical factor when it comes to AI adoption. Private hospitals in India are ready for AI adoption compared to public sector hospitals. Jain and Sharma argue that many public sector hospitals struggle because they lack equipment, budgets, and personnel. It as sourced by Chatterjee and Rana that Indian medical institutions have no policies to support green AI health care. Data privacy, lack of awareness and knowledge positions, and less training are the most significant barriers to AI in Indian institutions.

2. 5 Government policies and strategic frameworks:

The key policies that are meant to support the future of AI healthcare in India are the NDHM and NITI Aayog. Given that the two are generic and the AI green guidelines are not the stipulated, a need emerges to develop rules and

guidelines in the field of Green AI that Indian government should look at.

Mukherjee (2022) points out that while national initiatives recognize ethical AI, environmental considerations remain implicit. There is an urgent need for policies that **explicitly promote energy-efficient algorithms, green data centers, and low-power hardware usage** in the healthcare sector.

3. Research Methodology

3.1 Research Design

Using a mixed-methods research design, this study investigates the adoption and impact of Green AI in hospitals from the Bengaluru region of India. It takes a two-pronged approach, by combining quantitative methods, in order to give an overall view of institutional readiness, sustainability aspects and practical challenges of adopting Green AI.

3.2 Research Objectives

- To evaluate the awareness and application of Green AI in the healthcare organizations in Bengaluru.
- To explore main advantages and disadvantages of deploying Green AI in healthcare settings.
- To analyze trends of the adoption in both public and private healthcare facilities.
- To propose a strategic approach to sustainable AI deployment in healthcare.

3.3 Study Area

The study is limited to Bengaluru, a city which houses some of the nation's best information technology infrastructure, health care innovation, and smart city ventures. The reason for choosing Bengaluru as the representative location is twofold – (a) to define a leading digital health ecosystem in India, and (b) to signify the beginning of sustainable policies in the country.

3.4 Population and Sampling

Target audience: Decision makers of healthcare facilities (Hospital CEOs, IT managers, Chief medical officer, Sustainability officer of healthcare).

Methodology: Sampling Procedure A stratified random sampling was used to have diversity in:

- Type of school (public versus private)
- Bed size (small: <100, medium: 100–300, large: >300)
- Type of speciality (multi-specialty vs. super-specialty)

Sample size Information was collected from 24 hospitals in Bengaluru and a total of 212 valid responses were considered for quantitative analysis.

3.5 Data Collection Methods

Formal Questionnaire: Constructed under a 5-level Likert scale to ascertain awareness, the level of adoption, perceived advantages, limitations and environmental influences of Green AI.

Secondary Data Sources:

- Organizational reports on sustainability
 1. National health policy documents (e.g., NDHM, NITI Aayog AI reports)
 2. Industry reports on AI in health care
 3. Peer-reviewed literature

3.6 Methods and Tools of Data Analysis

Data Analysis:

Descriptive Statistics: Mean, Standard Deviation, Frequency

Inferential Statistics:

- t-tests and ANOVA to analyze adoption by type and size of health institution
- Multiple Regression Analysis to determine the drivers of Green AI uptake.

4 Data Analysis and Interpretation

This section provides a detailed analysis and interpretation of the quantitative data collected to evaluate the levels of awareness, adoption, perceived benefits, challenges, and institutional readiness concerning Green Artificial Intelligence (Green AI) in healthcare institutions in Bengaluru, India. Utilizing a mixed-methods research design, the study draws primarily from structured questionnaire responses obtained from 212 participants across 24 public and private medical institutions of varying sizes. The findings offer critical insights into the current state of Green AI integration and the factors influencing its implementation within the healthcare sector.

4.1 Demographic analysis:

Institution Type

Institution Type	Frequency	Percent
Public	104	49.1%
Private	108	50.9%

Data Analysis: The distribution is almost even: private (50.9%) and public schools (49.1%).

Interpretation:"Lessons learned from green AI awareness and adoption could be extended to the public and private sectors in Bengaluru and in both sectors – public and private sector – we could ensure inclusion.

Designation

Designation	Frequency	Percent
Administrator	49	23.1%
IT Manager	27	12.7%
Sustainability Officer	37	17.5%
Medical Director	54	25.5%
Others	45	21.2%

Data Analysis: The primary respondents were Medical Directors (25.5%) and Administrators (23.1%) with all other roles surveying less respondent personnel.

Interpretation: Various view points by decision makers and experts on sustainability imply holistic organisational views into Green AI implementation.

Institution size (Number of Beds)

Number of Beds	Frequency	Percent
< 100	74	34.9%
100–300	84	39.6%
> 300	54	25.5%

Data Analysis: The average middle size hospital (100–300 beds) accounts 39.6% and smaller facility (<100 beds) at 34.9%.

Interpretation: This makes it possible to evaluate how Green AI scales across institutional sizes – something crucial for both policy and implementation guidelines

Experience Years

Experience Years	Frequency	Percent
< 2 Years	56	26.4%
2–5 Years	56	26.4%
6–10 Years	49	23.1%
> 10 Years	51	24.1%

Data Analysis: The respondent experience was well-spread, both recent and long-standing professionals are well-represented.

Interpretation: Insights range from early career researchers through established experts, enabling credibility and diversity of views on Green AI.

4.2 Data Analysis and Interpretation of Green AI Adoption in Healthcare Institutions

Awareness of Green AI

Sl. No.	Variable	Mean	Std. Deviation
1	Familiarity with Green AI	3.45	1.350
2	Internal Discussions	3.43	1.390
3	Access to Literature	3.67	1.244

Data Analysis:

- All the averages are >3 so it means that there is a moderate to high degree of knowledge.
- The largest mean (3.67) belongs to Access to Literature, which indicates that most of the

respondents agree that they have access to materials on Green AI.

- Modest response variability is indicated by the standard deviations (1.244–1.390).

Interpretation:

Post Authoring: Respondents are already at least somewhat aware of Green AI and hearing it and its chatter in the follow up institution. The availability of literature is established, suggesting a supportive knowledge environment. However, there is some variability in awareness that suggests improvements could still be made to awareness initiatives.

Adoption of AI and Green AI Practices

Sl. No.	Variable	Mean	Std. Deviation
1	AI Usage in Ops	3.78	1.229
2	Energy-Efficient Tools	3.70	1.297
3	Green AI in Procurement	3.63	1.301
4	Eco-Friendly IT Involvement	3.75	1.262

Data Analysis:

- Average scores of 3.63 to 3.78 are illustrative of general consensus concerning the implementation of AI and sustainability.
- The highest average is for AI Usage in Operations (3.78) and IT department involvement (3.75).
- RegardingSDs- they are reliable, indicating no imbalance in agreement among the observers.

Interpretation:

There is a reason to hope for positive signs for the integration of AI, including Green AI into health care routines. IT departments are committed to sustainable procurement, bringing institutional change to greener AI tactics.

Perceived Benefits of Green AI

Sl. No.	Variable	Mean	Std. Deviation
1	Operational Efficiency	3.42	1.324
2	Sustainability Goals	3.61	1.236
3	Institution Reputation	3.71	1.338
4	Environmental KPI	3.69	1.202

Data Analysis:

- Average scores range between 3.42 and 3.71 with overall agreement on advantages.

- The highest importance value is Institutional Reputation (3.71).
- Moderate variation of items across all.

Interpretation:

Green AI considers to be advantageous, especially in terms of the improvement of the institution’s image and compliance to sustainability metrics. As for operational efficiency, although its mean is a little lower, moderate agreement is also observed, indicating an overall positive attitude.

Challenges in Implementing Green AI

Sl. No.	Variable	Mean	Std. Deviation
1	Mgmt Awareness Issue	3.67	1.245
2	Budget Constraint	3.50	1.330
3	Govt Support Lack	3.60	1.202
4	Tech Expertise Limitation	3.52	1.267

Data Analysis:

- The mean scores show moderate agreement with obstacles (3.50–3.67).
- The highest obstacle is LACK OF MANAGEMENT AWARENESS (3.67).
- Budget and technical knowledge is also a major issue.

Interpretation:

Main barriers are top management knowledge and lack of financial means. No government support and low technical capacity is another limitation that affects implementation, demonstrating the necessity for focused training and policy advocacy.

Section F: Institutional Readiness

Sl. No.	Variable	Mean	Std. Deviation
1	Digital Strategy	3.63	1.283
2	Sustainability in IT Policy	3.69	1.246

3	Startup Collaboration	3.55	1.259
4	AI-Sustainability Training	3.56	1.274

Data Analysis:

- Average values are between 3.55 and 3.69, and they confirm the assessment of the institutional readiness.
- The highest meaning score is sustainability in IT policy (3.69).
- There is consistency in response variation, indicating consistent progress.

Interpretation: Institutions are exhibiting promising signs of preparedness for Green AI adoption, with more strategic planning and policy integration. There’s also the partnering with other tech firms and the training programs are there (but can always be improved).

Comparative Analysis Using Inferential Statistics

4.5.1 Independent Samples t-Test: Public vs. Private Institutions

This evaluation was done to determine if there are any significant differences between public and private health care facilities in terms of their perceptions, adoption, and preparedness of Green Artificial Intelligence (Green AI) practices. Independent samples t-test was used for analysis with the institution type as the grouping variable (Group 1 = Public; Group 2 = Private).

Group Statistics Overview

Construct	Institution Type	N	Mean	Std. Deviation
Awareness	Public	104	3.5160	0.77568
	Private	108	3.5185	0.77249
Adoption	Public	104	3.7188	0.68593
	Private	108	3.7083	0.60421
Readiness	Public	104	3.6250	0.63762
	Private	108	3.5856	0.58121

t-Test Results

Construct	Levene’s Test Sig.	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval
Awareness	0.376	-0.023	210	0.981	-0.00249	[-0.21213, 0.20715]
Adoption	0.056	0.117	210	0.907	0.01042	[-0.16443, 0.18526]
Readiness	0.444	0.470	210	0.639	0.03935	[-0.12573, 0.20443]

Interpretation of Results

The t-test for independent samples showed no statistically significant differences among private and public institutions in all three intuitive constructs:

Awareness (p-value = 0.981): The respondents of both countries have similar level of awareness to the Green AI practice. The average scores were almost the same (Public = 3.5160 Private = 3.5185).

Adoption: The p-value of 0.907 implies that there is no significant variation in the adoption for Green AI tools and practices. Adoption readiness among both types of institutions was relatively similar.

Readiness: The variability among institutions in readiness to adopt greenAIpractices is statistically insignificant as evidenced by a p-value of 0.639.

This suggests a consistent participation with Green AI practices regardless of public or private ownership institutions as the level of awareness and willingness to adopt/readiness of Green AI appears to be similar in either case. This result reflects an overall acknowledgement in Indian healthcare settings of the value of sustainable AI practices.

Lessons for Policy and Practice

The homogeneity of responses across institution type indicates that future initiatives and guideline to promote Green AI can be standardized and consistently distributed both in public and private healthcare organizations. Therefore, strategies which regard the training, resource allocation and technology acceptance can be shaped upon one another without institution-specific customisation.

4.5.2 One-Way ANOVA:

Organisational Size and Green AI Organisation practices

One way analysis of variance (ANOVA) was performed to evaluate the potential effect of the size of the institutions on the adoption and perception of Green Artificial Intelligence (Green AI) strategies in the healthcare sector. Institution size: Small/medium/large was the independent variable. Green AI Awareness, Green AI Adoption, and Institutional Readiness were the dependent variables.

ANOVA Summary Table

Variable	Between Groups Sum of Squares	df	Mean Square	F	Sig. (p-value)
Awareness	0.541	2	0.271	0.451	0.637
Adoption	0.652	2	0.326	0.784	0.458
Readiness	1.252	2	0.626	1.703	0.185

The ANOVA output indicates that none of the Green AI practice variables have statistically significant variations across institutional sizes. That is, the F-statistic is 0.451 for Awareness ($p = 0.637$), 0.784 for Adoption ($p = 0.458$) and 1.703 for Institutional Readiness ($p = 0.185$). All of the p values are greater than 0.05, meaning that the mean scores for each variable are not significantly different across institutions (in terms of size).

Interpretation

Both of these conclusions suggested that the size of the healthcare institution (small, medium, or large) has not much impact on their awareness, adoption, or preparedness for Green AI. The homogeneity implies that sustainability driven by Green AI is likely a level playing field and ubiquitously embraced across all the organizations, big or small. One explanation might be that larger throughput institutions are more able to exercise top-down enforcement of the adoption of health technology standards or to access shared digital infrastructures and training, thus narrowing disparity between large and small providers.

As the ANOVA was not significant, post-hoc tests were not performed (e.g., Tukey's HSD) since there appeared to be no substantial differences between the groups that demanded pairwise comparisons. Practice and Policy Implications

The lack of significant heterogeneity between institution sizes also implies the potential scalability of Green AI initiatives, implying that policies and interventions focused on improving Green AI practices should be implemented uniformly across healthcare institutions without size-tailored adoption. This also suggests that there may be centralized decisions about how Green AI is implemented or institutionalized.

4.6 Multiple Regression Analysis

4.6.1 Motivation and model setup

In this regression analysis, we aimed to detect the driving factors which impact on the decision of adopting Green Artificial Intelligence (Green AI) in hospital. The dependent variable (Green AI Adoption) was the average value of items derived in Section C, while the independent variables considered were:

- 5 Institutional Readiness
- 6 Potential Benefits of Green AI
- 7 Barriers in Green AI Adoption
- 8 Awareness of Green AI
- 9 Type of Institution

4.6.2 Model Summary and Fit of the Model

The summary for the model is shown in Table 4.20. The R-square value was 0.009, which indicated that of the variance in Green AI adoption, 0.9% was able to be explained by both independent variables. The R2 adjusted was slightly negative at 0.015, indicating the model may not be generalizable to the population.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.097	.009	-0.015	0.64874

This means that the model’s ability to tell us something about the dependent variable is low.

4.6.3 ANOVA Test for Significance of the Model

The Results of analysis of variance (ANOVA). The omnibus F test of model coefficients was not significant (F = 0.395, p = 0.852), towards depicting that the proposed regression model fails to significantly predict the adoption of Green AI practices.

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.831	5	0.166	0.395	0.852
Residual	86.698	206	0.421		
Total	87.529	211			

4.6.4 Coefficient Estimates

Table shows the regression coefficients for the independent variables. None of the predictors demonstrated a statistically significant effect on Green AI adoption at the 5% significance level.

Predictor	B (Unstd.)	Std. Error	Beta (Std.)	t	Sig.
(Constant)	3.356	0.505	—	6.648	0.000
Awareness	0.012	0.058	0.014	0.205	0.838
Readiness	0.051	0.074	0.048	0.692	0.490
Perceived Benefits	-0.043	0.071	-0.042	-0.603	0.547
Challenges	0.080	0.072	0.078	1.118	0.265
Institution Type	-0.001	0.090	0.000	-0.007	0.995

4.6.5 Interpretation and Implications

Regression The regression analysis indicated that none of the predicted variables (institutional readiness, perceived benefits, awareness, challenges, institutional type) had a statistically significant impact on the adoption of GAIPs by the surveyed institutions. This discovery indicates that other factors, which were not measured in this study, may be influencing the adoption possibly, including external regulatory mandates, technological infrastructure maturity, or organizational culture. Moreover, the low R² would suggest that the predictors included explain very little of the variance, so more work needs to be done to improve the model or add relevant variables. For practical grammaritians the results reveal the complexity and multi-faceted nature of Green AI adoption within healthcare. Qualitative gaze or a mixed-methods could provide some latent factors shaping sustainable AI decision-making.

5. Findings of the study

5.1 Overview of the Study

- This study intended to explore the knowledge, uptake, and preparedness towards Green Artificial Intelligence (Green AI) by the healthcare organizations in Bengaluru, India. It also aimed to find out what were some of the benefits and barriers perceived and how the institutional differences between public and private sectors differed and finally to suggest on what strategic framework is needed to preserve and sustain an AI integration. Using the mixed method, the research solicited 212 valid questionnaires from 24 healthcare facilities of different ownerships (public and private) and sizes.

5.2 Descriptives on Perceptions and Practices

- Knowledge:** On average level of awareness for Green AI was moderate to high (e.g., “Access to Literature”, mean (M) = 3.67).
- Adoption:** Organizations are adopting Green AI, focusing on "AI Usage in Operations" (M = 3.78), and "Eco-Friendly IT Involvement" (M = 3.75).
- Benefits:** The most frequently identified benefits were “Institutional Reputation” (M = 3.71) and “Environmental KPIs” (M = 3.69).
- Barriers:** The most severe barriers were lack of management awareness (M = 3.67), lack of sufficient technical expertise, and budget restrictions.
- Readiness:** Institutions are ready, particularly in IT policies (M = 3.69), however training and cooperation must be strengthened.

5.3 Inferential Insights

- Public v Private Entities::** No differences were observed in awareness, adoption or readiness (p > 0.05), indicating consistent involvement, regardless of ownership.
- Institution Size:** One-way ANOVA revealed no significant differences between small, medium and large institutions, indicating that policies are scalable.
- Predictors of Uptake:** Linear regression analyses revealed low explanatory power (R² = 0.009, P =

0.852), none of the predictors were significant. This implies that there are other unobserved factors that affect the adoption of Green AI.

6. CONCLUSION AND RECOMMENDATIONS

The study investigated the knowledge, uptake, advantages, barriers to and institutional preparedness towards Green AI for healthcare organizations in Bengaluru, India. Based on 212 responses from 24 institutions, results show moderate to high level of awareness and pre-implementation Green AI in general and IT operations and eco-friendly practices in particular. Green AI is seen as something that can only be good for the institution's reputation and in line with their sustainability aspects.

However, key issues continue to persist – namely low level of management support, budget constraints, unavailability of government support, and shortages of technical expertise. However, institutions manifest such preparedness on the basis of sustainability-oriented IT policies and in collective undertakings.

Inferential statistics showed no differences in awareness, adoption or readiness by public and private institutions, and none across institution sizes, indicating similar levels of engagement. Nevertheless, the results of the regression indicate a weak predictive value ($R^2 = 0.009$), which denotes that unobserved factors, such as organisational culture or external regulations, might play a role in driving adoption.

RECOMMENDATIONS

REFERENCES

1. Aggarwal, N., & Joshi, M. (2021). Artificial intelligence adoption in Indian hospitals: An exploratory study. *International Journal of Healthcare Management*, 14(3), 122–135. <https://doi.org/10.1080/20479700.2020.1758912>
2. Chatterjee, S., & Rana, N. P. (2022). Digital health and sustainable transformation in emerging economies. *Technological Forecasting and Social Change*, 174, 121230. <https://doi.org/10.1016/j.techfore.2021.121230>
3. Government of India. (2021). India's Updated Nationally Determined Contributions (NDC). UNFCCC. <https://unfccc.int/documents/619180>
4. Jain, R., & Sharma, M. (2023). Institutional readiness for AI in healthcare: A comparative study of public and private hospitals in India. *Journal of Health Management*, 25(1), 45–59. <https://doi.org/10.1177/09720634231123458>
5. Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, 2(4), 230–243. <https://doi.org/10.1136/svn-2017-000101>
6. Ministry of Health and Family Welfare. (2020). National Digital Health Mission Strategy Overview. Government of India. <https://ndhm.gov.in>
7. Mishra, P., & Rao, V. R. (2022). Green artificial intelligence: An Indian perspective. *Indian Journal of Sustainable Computing*, 4(1), 1–10.
8. Mukherjee, A. (2022). Responsible AI in India: A policy review of healthcare applications. *AI & Society*, 37(4), 1123–1139. <https://doi.org/10.1007/s00146-021-01213-9>
9. NITI Aayog. (2021). Responsible AI for All: Part 1 – Principles for Responsible AI. Government of India. <https://www.niti.gov.in/responsible-ai-all>
10. Raghavan, A., & Deshmukh, S. (2021). Evaluating the environmental cost of healthcare AI solutions in India. *Journal of Environmental Informatics*, 38(2), 45–59.
11. Schwartz, R., Dodge, J., Smith, N. A., & Etzioni, O. (2020). Green AI. *Communications of the ACM*, 63(12), 54–63. <https://doi.org/10.1145/3381831>
12. Strubell, E., Ganesh, A., & McCallum, A. (2019). Energy and policy considerations for deep learning in NLP. *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, 3645–3650. <https://doi.org/10.18653/v1/P19-1355>
13. Topol, E. (2019). *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*. Basic Books

These are some of the steps Indian healthcare institutions may want to take to promote the greening of AI adoption, and in line with this, meet the dual goals of technology advancement and national sustainability...