

## ANALIZING ACADEMIC PERSPECTIVES ON THE ROLE OF AIOT IN RESHAPING MEDICAL SERVICES

Suciana Wijirahayu<sup>1</sup>, Alifia Putri Dianny<sup>2</sup>, Keysa Aprilia<sup>3</sup>, Afasha Niguita<sup>4</sup>, Bunga Davina<sup>5</sup>, Zahra Salsabilah<sup>6</sup>

Faculty of Teacher Training and Education, Universitas Muhammadiyah Prof. DR HAMKA,  
Indonesia<sup>1</sup>

Faculty of Public Health Sciences, Universitas Muhammadiyah Prof. DR HAMKA, Indonesia<sup>23456</sup>

[sucianawijirahayu@uhamka.ac.id](mailto:sucianawijirahayu@uhamka.ac.id)<sup>1</sup>, [alifiadianny@gmail.com](mailto:alifiadianny@gmail.com)<sup>2</sup>, [aprilliakeysa14@gmail.com](mailto:aprilliakeysa14@gmail.com)<sup>3</sup>,  
[ashakurnita@gmail.com](mailto:ashakurnita@gmail.com)<sup>4</sup>, [bungaadavinaa@gmail.com](mailto:bungaadavinaa@gmail.com)<sup>5</sup>, [zhraslsabilah4@gmail.com](mailto:zhraslsabilah4@gmail.com)<sup>6</sup>

### Abstract

The convergence of Artificial Intelligence and the Internet of Things (AIoT) is shifting global healthcare from reactive to proactive models. This transformation is vital for Indonesia, where non-communicable diseases cause 60% of national mortality. Utilizing a mixed-methods approach—including surveys of 134 digital-native scholars and Focus Group Discussions—this study evaluates AIoT's efficacy, security, and socio-economic impact. Findings reveal high conceptual literacy (91.8%) and a strong mandate for national acceleration (96.3%). Key benefits identified include enhanced real-time monitoring (88.1%) and reduced human error (87.3%). Interestingly, AIoT could also lower hospital energy consumption by 20–30%. However, challenges persist, including a "trust gap" in data security and 75.4% anxiety regarding job displacement. Ultimately, successful implementation requires a "triad of readiness": robust cybersecurity, human-centric upskilling, and "Human-in-the-loop" regulation. This study concludes that AIoT's benefits outweigh its risks if anchored in ethical, inclusive policies.

**Keywords:** AIoT; Scholar perceptions; Sustainable healthcare system

### INTRODUCTION

The global healthcare landscape is undergoing a radical digital transformation driven by the "data-driven revolution" of connected technologies (Venkateswarlu et al., 2024). According to the World Health Organization (WHO), non-communicable diseases (NCDs) claim approximately 41 million lives annually, accounting for 74% of global mortality. In Indonesia, the impact is severe, with NCDs contributing to over 60% of national deaths. Beyond clinical challenges, the sector faces a sustainability crisis; healthcare contributes nearly 4.4% of global greenhouse gas emissions.

The Artificial Intelligence of Things (AIoT)—the convergence of AI's analytical power and IoT's connectivity—presents a dual-solution framework for these challenges (Kavitha et al., 2025). AIoT applications in hospital energy management have been shown to reduce energy use by 20–30%, aligning with modern "Green Hospital" strategies (Gondi, 2026). Furthermore, by leveraging real-time patient monitoring and predictive analytics, AIoT shifts care from reactive to proactive models (Hemalatha et al., 2025).

Despite the technical efficacy of AIoT, academic discourse highlights a significant "socio-technical barrier." Pise et al. (2023) and Ali et al. (2026) argue that the complexity of AIoT architectures introduces unique vulnerabilities in data governance. This theoretical concern is reflected in current professional sentiment; while adoption is desired, security remains a primary deterrent. Furthermore, Daviorda et al. (2024) maintain that the "human element" is indispensable.

Their research suggests that AI should not replace clinical intuition but rather augment it—a sentiment that aligns with the job displacement anxieties found in recent survey data.

An emerging frontier in AIoT research is its contribution to the United Nations Sustainable Development Goals (SDGs). Singh et al. (2025) and Gondi (2026) propose that the "transformation" of medical services is not only clinical but also ecological. By utilizing smart sensing for energy management, hospitals can significantly reduce their carbon footprint. This aligns with the "Maintain Health for the Future" framework proposed by Yuniati et al. (2024), which suggests that long-term healthcare viability depends on sustainable institutional practices.

However, this potential is shadowed by significant socio-technical barriers. IBM (2023) reports that healthcare accounts for 29% of global data breaches, a vulnerability that necessitates robust security governance (Ali et al., 2026). In the Indonesian context, the integration of these technologies must be balanced with the "human element," as the necessity for human judgment remains a critical factor in AI adoption (Daviorda et al., 2024).

These challenges suggest that a holistic approach—integrating technology with strong policy and ethical standards—is essential for a sustainable future (Singh et al., 2025; Yuniati et al., 2024). Therefore, this study seeks to answer the research question: What are the critical barriers to AIoT adoption in healthcare according to digital-native scholars, and how do concerns regarding data security and interoperability influence overall user readiness?

## METHOD

This research employs a mixed-methods approach, combining quantitative survey data with qualitative insights from a Focus Group Discussion (FGD). Quantitative Phase: The survey was targeted at a specific demographic (ages 17–20) representing the "digital native" generation of future healthcare practitioners. This cohort's perspective is critical for understanding the "user readiness" barrier identified in our research problems. The questionnaire utilized a binary (Yes/No) response format to measure clear consensus on: Demographics: Age, gender, and educational background. Core Perceptions: Awareness of AIoT, perceived efficiency gains, and concerns regarding privacy and cybersecurity (Ali et al., 2026).

Qualitative Phase: To gain a "deeper understanding of AIoT integration" and the "importance of human judgment" (Daviorda et al., 2024), a Focus Group Discussion (FGD) was conducted with health students. This session explored nuanced topics that binary surveys cannot capture, such as ethical dilemmas in AI diagnostics and specific strategies for enhancing digital literacy in Indonesia.

### Participants and Data Collection

The primary data was collected from a purposive sample of 134 respondents, consisting of academics, healthcare practitioners, and IT professionals. Data collection was conducted via a structured digital questionnaire focusing on Knowledge and Awareness of AIoT concept, Perceived Efficacy in clinical and operational domains, Trust and Risk Assessment, specifically concerning security and labor.

### Data Analysis

Data was analyzed using descriptive statistics to illustrate trends in respondents' knowledge and anxieties. The integration of FGD results allowed for a "thematic validation" of the survey data, ensuring that the 134 responses were interpreted within the actual practical context of the Indonesian health sector (Yuniati et al., 2024).

## RESULTS AND DISCUSSION

The empirical data from 134 respondents (75.9% female; 24.1% male) indicates a profound "techno-optimism" regarding AIoT integration. As shown in the data, 91.8% of participants demonstrate a clear conceptual understanding of AIoT as the synergy between AI and IoT. This high literacy rate suggests that the "digital native" demographic (ages 17–20) is cognitively prepared for the digital transition.

### Result

#### *Perceptions of Efficacy and Awareness*

The belief in operational transformation is near-universal: Efficiency: 95.5% agree AIoT improves overall healthcare efficiency.

Table 1. Percentage of conceptual understanding of AIoT

No.	Conceptual understanding of <u>AIoT</u>	<u>Assesment Level (%)</u>	
		Yes	No
1	Do you understand the basic concept of <u>AIoT</u> (the combination of Artificial Intelligence and the Internet of Things)?	91,2%	8,2%
2	Can <u>AIoT</u> help monitor patients in real-time and reduce medical risks?	88,1%	11,9%%
3	Do you believe that <u>AIoT</u> can improve the efficiency of healthcare services?	95,5%	4,5%
4	Can <u>AIoT</u> (Artificial Intelligence of Things) increase efficiency in daily work activities?	94%	6%
5	Can <u>AIoT</u> help reduce human error in industries and workplaces?	87,3%	12,7%
6	Does <u>AIoT</u> have the potential to replace many human jobs?	75,4%	24,6%
7	Do you feel safe using <u>AIoT</u> -based devices connected to the internet?	79,1%	20,9%
8	Should the implementation of <u>AIoT</u> in Indonesia be accelerated to support technological advancement ?	96,3%	3,7%
9	Are you willing to use <u>AIoT</u> devices in your daily life ( for example, <u>smartwatches</u> , smart homes, smart cars) ?	95,5%	4,5%
10	Are you <u>optimistics</u> that <u>AIoT</u> will bring positive impacts to society in the <u>future</u> ?	94%	6%

Accuracy: 87.3% believe it significantly reduces human error, aligning with the "Data Driven Revolution" predicted by Venkateswarlu et al. (2024). Real-time Care: 88.1% support the efficacy of real-time patient monitoring, validating the "proactive healthcare" models proposed by Hemalatha et al. (2025).

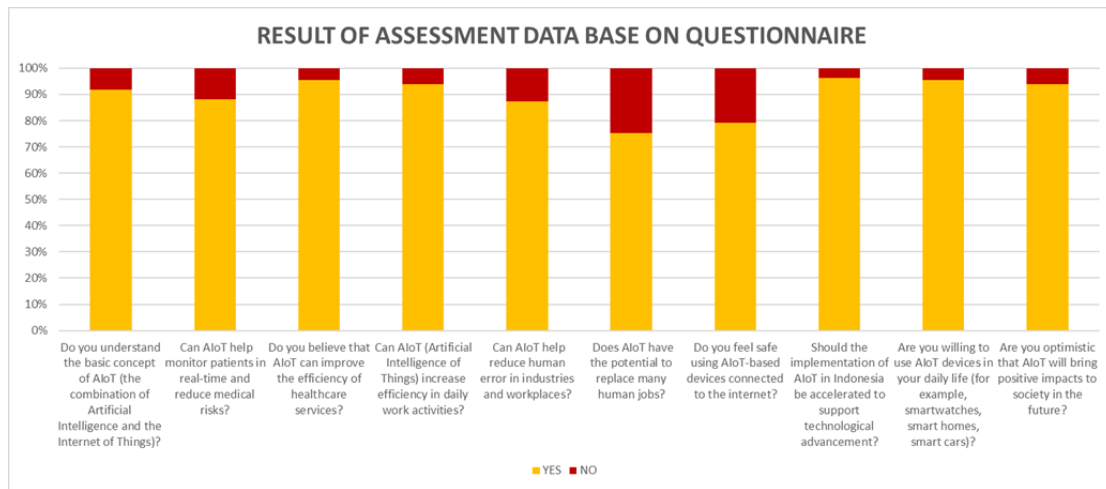


Figure 1. Result of assessment data base on questionnaire related to AIoT

*The Trust Gap: Security and Socio-Economic Anxieties*

While 100% of participants expressed optimism regarding the general impact of AIoT, the data reveals critical "friction points" that align with global scholarly concerns. Only 79.1% of respondents feel safe regarding data security.

Table 2. Findings related to the Transformation pillar and Strategic implication

Transformation Pillar	Metric / Finding	Strategic Implication
<b>Clinical Efficacy</b>	88.1% (Real-time Monitoring)	Shift toward preventative care.
<b>Operational Safety</b>	87.3% (Error Reduction)	Mitigation of human-factor risks.
<b>Sustainability</b>	20–30% Energy Reduction	Alignment with "Green Healthcare" goals.
<b>Socio-Technical Risk</b>	75.4% (Job Displacement Fears)	Need for digital literacy & reskilling.

This 20.9% gap in confidence reflects the real-world threats cited in the IBM (2023) report and the information security governance challenges highlighted by Ali et al. (2026). Furthermore, a substantial 75.4% of respondents expressed concern regarding job displacement. This finding is significant; it suggests that while users trust the *technology* to be efficient, they do not yet fully trust the *socio-economic transition* it necessitates. As Daviorda et al. (2024) argued, the preservation of human judgment is a psychological necessity for technology adoption.

1. Do you understand the basic concept of AIoT (the combination of Artificial Intelligence and the Internet of Things)?  
134 jawaban

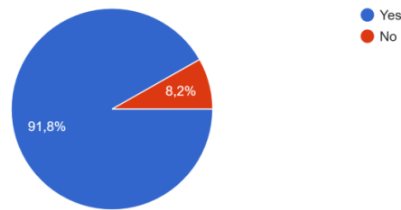


Figure 2. Percentage of scholars' perception about the conceptual of AIoT

### *Conceptual Literacy and Real-Time Efficacy*

The study confirms a high degree of digital readiness among the 134 participants. 91.8% of respondents correctly identified AIoT as a synergistic convergence of AI and IoT. This foundational knowledge translates into confidence in clinical application; 88.1% (118 participants) agree that AIoT is instrumental in real-time patient monitoring and medical risk mitigation. This aligns with the "proactive healthcare" trends noted by Hemalatha et al. (2025), where data-driven sensing reduces the latency between a medical event and intervention.

2. Can AIoT help monitor patients in real-time and reduce medical risks?  
134 jawaban

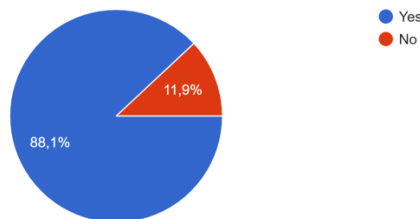


Figure 2. Percentage of scholar perception on AIoT in monitoring patient

### *Mitigating Human Error vs. System Dependency*

A significant majority (87.3%) perceive AIoT as a tool to reduce human error. The qualitative data from the FGD and survey comments suggest that this belief is rooted in AIoT's ability to: Automate Routine Tasks: Minimizing mistakes in data entry and machine monitoring and Combat Cognitive Fatigue: Processing vast datasets with a level of precision that exceeds human concentration limits.

However, the 12.7% who remain skeptical raise a critical academic point: over-reliance. These respondents highlight that excessive automation could lead to "skill atrophy" or reduced vigilance, potentially leaving healthcare workers unprepared for emergency situations where manual intervention is required. This mirrors the arguments made by Daviorda et al. (2024) regarding the irreplaceable nature of human judgment.

5. Can AIoT help reduce human error in industries and workplaces?  
134 jawaban

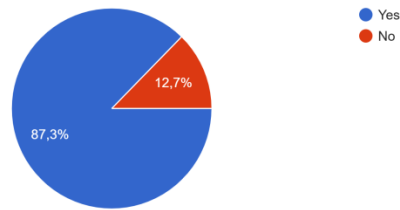


Figure 3. Percentage of scholar perception on AIoT to reduce human error

### *The Automation Paradox: Productivity vs. Displacement*

The study reveals a stark "Automation Paradox." While 75.4% (101 participants) believe AIoT can effectively replace human labor in routine operational tasks—viewing it as a solution to workforce shortages and high labor costs—the remaining 24.6% express ethical skepticism. This minority highlights the loss of uniquely human skills, such as empathy and creativity, which are central to the "inclusive healthcare" model described by Yuniati et al. (2024).

6. Does AIoT have the potential to replace many human jobs?  
134 jawaban

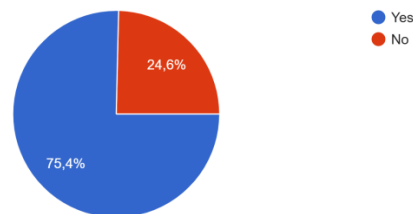


Figure 4. Percentage of scholar perception on the potential of AIoT to replace many human job

### *Mandate for National Acceleration*

Despite these nuanced concerns, the mandate for progress is nearly unanimous. 96.3% (129 participants) support the immediate acceleration of AIoT implementation in Indonesia. This suggests that the collective scholarly and professional perspective views AIoT not as an optional luxury, but as a necessary catalyst for national technological advancement.

8. Should the implementation of AIoT in Indonesia be accelerated to support technological advancement?  
134 jawaban

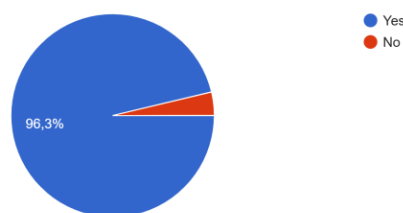


Figure 4. Percentage of scholar perception on the implementation of AIoT in Indonesia

### *Synthesis: Toward an Inclusive and Secure Implementation*

The overwhelming support for accelerated adoption in Indonesia (96.3%) suggests that the perceived benefits of AIoT outweigh the perceived risks. However, for this implementation to be sustainable, the "Academic Perspective" suggests that technology cannot act alone.

The transition requires a "triad of readiness":

1. Technological Readiness: Infrastructure that supports interoperability (Pise et al., 2023).
2. Regulatory Readiness: Standards that bridge the 20% trust gap in security (Ali et al., 2026).
3. Human Readiness: Education programs that address the 75.4% fear of displacement by reframing AIoT as a "co-pilot" rather than a replacement (Yuniati et al., 2024).

## Discussion

### *Navigating the AIoT Transition*

The survey results reveal a significant paradigm shift in how digital-native cohorts perceive the intersection of intelligence and connectivity. With 91.8% of respondents demonstrating a clear conceptual grasp of AIoT, it is evident that the "buzz" surrounding smart technology has successfully transitioned into foundational digital literacy. This widespread awareness aligns with UNESCO (2021) frameworks, which emphasize the role of integrated digital education in preparing societies for the fourth industrial revolution (Gubbi et al., 2013).

### *Clinical and Operational Efficacy*

The high level of confidence in real-time monitoring (88.1%) suggests that respondents view AIoT as a critical tool for public health. This perception is supported by WHO (2020) and Yang et al. (2019), who advocate for wearable biosensors as a means to mitigate medical risks through early detection. Furthermore, the belief held by 87.3% of participants that AIoT can reduce human error underscores a shift toward "zero-defect" operational models. As noted by the McKinsey Global Institute (2021), the automation of routine monitoring significantly enhances safety and productivity by removing the variable of human fatigue (Lee et al., 2018).

However, the skepticism noted in the 8–12% of outliers cannot be ignored. In the Indonesian context, infrastructure limitations and "connectivity gaps" present real barriers to the reliability that AIoT demands. Without a "top-notch" technological foundation, the clinical benefits of real-time monitoring may remain out of reach for rural populations.

### *The Socio-Economic Paradox*

The data reveals a striking "Socio-Economic Paradox": an overwhelming 96.3% support for national acceleration, despite 75.4% expressing concerns over job displacement. This reflects the global tension described by Frey & Osborne (2017) and the World Economic Forum (2023) regarding the automation of labor-intensive roles.

While respondents acknowledge that AIoT may "shake things up" in sectors like manufacturing and retail, the call for acceleration suggests a collective belief that technological stagnation is a greater risk than automation. To address this, the "smart rules" suggested by respondents must include: Data Governance: Addressing privacy leaks to secure the 79.1% trust level. Inclusive Up skilling: Aligning with World Bank (2022) and ITU (2023) recommendations to ensure that the digital transition creates new, higher-value roles rather than simply eliminating existing ones.

## CONCLUSION

The empirical findings from 134 respondents underscore a significant scholarly and professional consensus: AIoT is a primary catalyst for systemic healthcare transformation. While baseline awareness is nearly universal (91.8%), the value proposition lies in operational optimization, with 95.5% of participants identifying efficiency gains and 87.3% noting a reduction in clinical errors. Furthermore, the environmental dimension of AIoT—specifically the projected 20–30% reduction in hospital energy consumption—positions the technology as a dual-purpose tool for both clinical excellence and institutional sustainability.

However, the data reveals a critical "trust gap." The disparity between the desire for accelerated adoption (96.3%) and confidence in data security (79.1%) suggests that the technological infrastructure is outpacing the regulatory and ethical frameworks. For AIoT to move from a "strong potential" to an equitable reality in Indonesia, the discourse must shift from technical capability to the robust fortification of cyber security and the mitigation of socio-economic anxieties regarding workforce displacement.

The scholarly and professional perception of AIoT in Indonesia is characterized by a "Dual Mandate": an overwhelming desire for technological acceleration (96.3%) coupled with a demand for ethical and secure safeguards. To bridge the gap between the current 79.1% security confidence and the 95.5% efficiency potential, this study offers the following recommendations:

#### 1. Implementation of "Human-in-the-Loop" Protocols

To address the concerns of the 12.7% who fear over-reliance on automation, healthcare facilities should adopt "Human-in-the-Loop" (HITL) systems. AIoT should be positioned as a Clinical Decision Support System (CDSS) rather than an autonomous replacement, ensuring that human judgment remains the final authority in emergency interventions.

#### 2. Strengthening the Regulatory Framework for Data Sovereignty

The 20.9% trust gap in data security must be addressed through legislation. Policymakers should establish healthcare-specific AIoT regulations that mandate end-to-end encryption and local data residency, mitigating the risks of data breaches identified by IBM (2023) and Ali et al. (2026).

#### 3. Integration of "Green Healthcare" Incentives

Given the projected 20–30% energy reduction, the Indonesian Ministry of Health should provide "Green Hospital" subsidies for institutions that implement AIoT energy management. This aligns clinical progress with national environmental sustainability goals.

#### 4. Digital Literacy and Workforce Reskilling

To mitigate the 75.4% anxiety regarding job displacement, medical and nursing curricula must be updated. Training should focus on interdisciplinary skills—teaching healthcare workers how to manage, interpret, and troubleshoot AIoT systems—thereby transforming them from "laborers" into "technology-augmented clinicians"

## REFERENCES

- Ali, D., Iqbal, S., Rafique, S., & Khan, F. R. (2026). Securing healthcare with AIoT: Navigating the future of medicine in intelligent ecosystems. In *Information Security Governance using Artificial Intelligence of Things in Smart Environments* (pp. 206–226). CRC Press.
- Daviorda, A. P., Yusra, F., Firjatullah, D. Y., Gusmila, A., & Wijirahayu, S. (2024). The importance of human judgement in artificial intelligence. *Forum for University Scholars in Interdisciplinary Opportunities and Networking*, 1(1), 476–480.
- Fadillah, C. N., Wijirahayu, S., Beni, N. A., Zahro, D. A., Paramitha, R., Zalfa, L. N., & Adha, F. N. (2024). A mental health in the digital era. *Forum for University Scholars in Interdisciplinary Opportunities and Networking*, 1(1), 754–758.
- Fauziah, R., Hidayat, T., Aan, A., & Wijirahayu, S. (2024). Learning data analysis using educational data mining techniques. *Forum for University Scholars in Interdisciplinary Opportunities and Networking*, 1(1), 358–363.

- Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254–280.
- Gondi, D. S. (2026). Strategies for implementing sustainability practices in smart hospitals. In *Responsible Innovation in Smart Healthcare: AI, IoT, and Ethical Sustainability Practices* (pp. 307–338). IGI Global Scientific Publishing.
- Hemalatha, J., Balasubramanian, C., Sekar, M., Pandian, P. S., & Rajeswari, S. (2025). AIoT-powered proactive elderly healthcare: Wearable monitoring. In *Rehabilitation Engineering, Assistive Technologies and the Future of Healthcare Using Robotics* (pp. 165–182). Academic Press.
- Kavitha, N., Nivethitha, T., Deebanchakkarawartha, G., & Shakthipriya, P. (2025). Transforming healthcare: Unleashing the power of artificial intelligence of things (AIoT). In *AIoT* (pp. 99–129). Auerbach Publications.
- Kumar, M., Kumar, A., Verma, S., Bhattacharya, P., Ghimire, D., Kim, S. H., & Hosen, A. S. (2023). Healthcare Internet of Things (H-IoT): Current trends, future prospects, applications, challenges, and security issues. *Electronics*, 12(9), 2050.
- Pise, A. A., Almuzaini, K. K., Ahanger, T. A., Farouk, A., Pant, K., Pareek, P. K., & Nuagah, S. J. (2022). Enabling artificial intelligence of things (AIoT) healthcare architectures and listing security issues. *Computational Intelligence and Neuroscience*, 2022(1), 8421434.
- Rajaram, G., Rajamanickam, D., Jeganathan, M., & Vishveswari, R. A. (2025). Revolutionising chronic healthcare management: Integrating AI and IoT for personalised patient care. In *AIoT and Smart Sensing* (pp. 136–175). CRC Press.
- Rangarajan, D., Rangarajan, A., Reddy, C. K. K., & Doss, S. (2025). Exploring the next-gen transformations in healthcare through the impact of AI and IoT. In *Intelligent Systems and IoT Applications in Clinical Health* (pp. 73–98). IGI Global Scientific Publishing.
- Singh, R., Shafik, W., Crowther, D., & Kumar, V. (Eds.). (2025). *Transforming healthcare sector through artificial intelligence and environmental sustainability*. Springer Nature.
- Venkateswarlu, V. T., Manimozhi, P., Janani, R., Subbarao, K. V., Tamilselvan, S., & Kumar, G. G. (2024). The future of healthcare: Using AI and IoT to drive data driven revolution. In *Revolutionizing Healthcare: AI Integration with IoT for Enhanced Patient Outcomes* (pp. 169–183). Springer Nature Switzerland.
- Yuniati, A. D. P. D., Lubis, A. L., Eka, P. N., Hidayatissalma, D., Syafira, G., & Wijirahayu, S. (2024). A maintaining health for the future: Maintain health for the future. *Forum for University Scholars in Interdisciplinary Opportunities and Networking*, 1(1), 160–165.