

Investigating the Ethical Implications of Artificial Intelligence (AI) in Medicine

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Abstract

This study investigates the multifaceted ethical implications of Artificial Intelligence (AI) in medicine. Since its introduction in the 1950s, AI has revolutionized healthcare, offering unprecedented opportunities for improved diagnosis, personalized treatment and enhanced patient outcomes due to increasing processing power and vast digital data. While this technological advancement holds immense potential to improve patient care, it also raises significant concerns about issues such as data privacy, informed consent and the potential for biases and errors in AI systems. This research aims to investigate these ethical implications, focusing on the intersection of technological innovation and human values and to provide recommendations for the responsible and safe use of AI in healthcare. The study employs a mixed-methods approach, combining a comprehensive qualitative narrative review of existing literature with a quantitative descriptive survey of 32 healthcare professionals and patients at Sane Plus Diagnostics, Ibadan, Nigeria. The findings from this study reveal a complex and nuanced perspective, affirming that while participants see AI as a valuable tool, their trust is conditional and does not extend to full autonomy. The research identified and analyzed ethical challenges such as overreliance on AI for diagnosis, inadequate data privacy protection and the potential for bias. It also highlights a notable disconnect between individual ethical awareness and the effectiveness of institutional reporting mechanisms. The examination of these ethical implications provides a deeper understanding of the complex interplay between technology and human values. The successful and responsible integration of AI in medicine requires a balanced approach that prioritizes robust governance frameworks, fosters human-AI collaboration and actively addresses concerns regarding bias and transparency to ensure that AI-driven advancements prioritize patient well-being, safety and dignity.

Keywords: Artificial Intelligence (AI), Healthcare, Medicine, Data Privacy, Fairness

1. Introduction

Artificial Intelligence (AI) is broadly referred to as the capacity of a system to interpret and learn from external data, then apply that knowledge to accomplish specific tasks and goals through adaptable flexibility. The roots of AI can be traced back to the 1950s when early computer-aided programs were developed to assist in medical diagnoses. Today, it is evident in virtually every hemisphere of modern-day activities. Tools powered by the capabilities of AI span a wide range of areas, from enabling personalized medicine to improving diagnostics in medical imaging. The integration of AI and Machine Learning (ML) has transformed healthcare. This transformation has revolutionized medical research by ushering in unprecedented opportunities in the improvement of patients' care and streamline of clinical workflows (Tilala et al., 2024). AI has the capability to address long-standing challenges in the field of healthcare and even create a new data-driven era (Herington et al., 2023). But then, integrating AI into healthcare comes with some challenges. The widespread adoption of AI in medicine has brought about a significant raise in legal, ethical and social concerns. Ethical questions that have been identified include patient and clinician autonomy, the lack of transparency in algorithms, accountability for physicians and developers and the potential for AI to exacerbate existing health disparities in marginalized populations (Anishchenko et al., 2023; Tilala et al., 2024). Other concerns revolve around data privacy (with respect to informed consent and reliance on patient data for training AI systems) and security, algorithmic bias and the need for proper clinical validation of these technologies (Tilala et al., 2024; Herington et al., 2023; Weidener & Fischer, 2024a; Stogiannos et al., 2025). These concerns require careful considerations and governance so as to ensure responsible and equitable deployment (Anishchenko et al., 2023; Weidener & Fischer, 2024b). The review by Isiaka et al. (2025) equally underscores these ethical. The authors cautioned that biases in training datasets could result in inequitable care, especially for underrepresented populations. Beyond clinical procedures, AI's ethical ramifications affect how society views the provision of healthcare. Both Patients and healthcare professionals are skeptical about being replaced with automation. Given that AI is both a revolutionary tool and a source of ethical dilemmas, this study aims to investigate the ethical issues that both healthcare professionals and patients experience with AI applications in a real-world healthcare setting. Focusing on Sane Plus Diagnostics, Ibadan, Nigeria, the research seeks to provide practical advice for striking a balance AI innovation with the preservation of patient dignity, privacy and safety. By addressing these issues, this research contributes to the growing conversation on ethical AI in healthcare thereby offering a roadmap for integrating technology with human values.

2. Related Works

The foundation of artificial intelligence (AI) in medicine rests on conceptual, theoretical, and empirical contributions that collectively aim to advance its application while ensuring appropriate governance. Conceptually, AI represents a paradigm shift in healthcare, moving beyond traditional approaches toward data-driven models of diagnosis, treatment, and administration. Central to this conceptualization is the application of machine learning (ML) and natural language processing (NLP) to support tasks such as clinical diagnosis, predictive medicine, and administrative management (Jeyaraman et al., 2023; Modi, 2023). Rather than positioning AI as a substitute for human expertise, scholars such as Mensah and Addy (2024) emphasize its role as an augmentative tool that enhances professional capabilities and enables more individualized, efficient, and effective patient care.

Theoretical discussions of AI in medicine often center on bioethics and principles of social justice. Among the most pressing concerns is the “black box” problem, where the opacity of AI decision-making processes undermines transparency and accountability, particularly in contexts of medical negligence (Rawas, 2024). Closely related is the challenge of algorithmic bias, which arises when AI systems trained on unrepresentative datasets reinforce or exacerbate existing health disparities (Modi, 2023; Stogiannos et al., 2025). Such issues threaten the principle of justice in healthcare by producing inequitable outcomes across demographic groups. Establishing clear moral guidelines to address these challenges is therefore essential to ensure that AI is both effective and ethically sound.

Empirical studies extend these theoretical debates by examining the practical consequences of AI adoption. Evidence from citizen and expert panels suggests that while there is broad recognition of AI’s potential benefits, concerns remain regarding its societal implications and the urgent need for strong governance mechanisms (Couture et al., 2023; Islam, 2024). Evaluations of existing AI applications illustrate its dual nature: on one hand, AI can deliver transformative improvements in healthcare delivery; on the other, it introduces new operational and ethical challenges that demand careful oversight (Ingole et al., 2024; Tilala et al., 2024).

Recent scholarship has also emphasized the promise and risks of AI in predictive medicine. Isiaka et al. (2025), in their systematic review, highlight how predictive AI technologies can anticipate disease onset, progression and treatment outcomes by leveraging large-scale patient data. This capacity to forecast clinical trajectories has the potential to transform healthcare from a reactive system into a proactive one, enabling earlier interventions and more personalized care. Yet, their review also underscores significant ethical challenges, including patient consent, data privacy and algorithmic transparency, which mirror broader concerns raised in the present study. The authors caution that unless inclusivity and bias testing are prioritized, predictive AI may entrench inequities rather than reduce them. These insights resonate strongly with the ethical debates surrounding AI in healthcare,

demonstrating how predictive innovations simultaneously advance precision medicine while amplifying the need for robust ethical safeguards. These ethical questions become even more complex in specific clinical contexts. For instance, in pediatric medicine, AI raises heightened concerns because children cannot provide fully informed consent, raising issues related to parental autonomy, data privacy and liability (Abusamra et al., 2025). Algorithmic bias also continues to draw attention, as it risks exacerbating systemic inequities and undermining justice in healthcare (Modi, 2023; Ingole et al., 2024). Deivayanai et al. (2025) caution that while AI accelerates diagnostic and pharmaceutical innovations, the absence of adequate ethical oversight could compromise patient safety and weaken professional accountability. Similarly, transparency is crucial: when clinicians are unable to explain AI-generated recommendations to patients, trust is undermined and liability concerns are heightened (Mensah & Addy, 2024). Moreover, the reliance of AI systems on large volumes of sensitive patient data introduces significant risks related to privacy and security, including the possibility of data breaches or misuse (Islam, 2024; Abusamra et al., 2025). In response to these challenges, a range of ethical frameworks and governance models has been proposed to guide the responsible integration of AI in healthcare. These frameworks aim to balance the transformative potential of AI with safeguards that prioritize patient safety, privacy and equity (Mensah & Addy, 2024). Core to these proposals are accountability and transparency, which ensure that AI systems are auditable and that their outputs are comprehensible to both clinicians and patients (Modi, 2023). Another priority is the establishment of coherent regulatory frameworks. As Islam (2024) and Ntjamba and Ashipala (2025) argue, fragmented regulations risk leaving critical gaps, whereas unified governance frameworks can provide clear, adaptable standards that keep pace with technological developments. Ultimately, these initiatives seek to cultivate public trust while ensuring that AI is deployed in ways that are equitable, transparent, and ethically responsible (Couture et al., 2023; Eyo-Udo et al., 2025).

3. Methodology

This research employs a mixed-methods approach to investigate the ethical implications of AI in medicine. It combines a qualitative narrative review of existing scholarly literature with a quantitative descriptive survey conducted at a single healthcare institution. This blended methodology provides a comprehensive exploration of the topic, integrating broad theoretical and conceptual insights with specific, empirical data.

3.1 Research Design

This study adopted a descriptive survey research design to explore the ethical implications of AI in medicine. A descriptive design was chosen to effectively capture participants' perspectives and behaviours without manipulating variables. This approach enabled the systematic collection and analysis of data to identify patterns and draw conclusions about ethical concerns related to AI applications in healthcare.

3.2 Study Area

The research was conducted at Sane Plus Diagnostics, Ibadan, Nigeria. This diagnostics center was selected because of its integration of modern healthcare technologies such as AI-assisted tools thereby providing a suitable context for examining the ethical implications of AI in clinical practice.

3.3 Population and Sampling

The target population comprised healthcare professionals and patients at Sane Plus Diagnostics, Ibadan. A total enumeration sampling technique was employed due to the manageable size of the population, ensuring the inclusion of all available participants. This yielded a sample size of 32 respondents, including radiographer, doctors, nurses, pharmacists and patients, providing a diverse range of insights into AI's effects on medical decision-making and its ethical dimensions.

3.4 Research Instrument and Data Collection

A self-administered structured questionnaire was the primary data collection instrument. The questionnaire was divided into two sections: Section A for demographic information and Section B for assessing perceptions of AI's ethical implications, such as data privacy, transparency, biases and accountability. The questions were designed using a Likert scale. The instrument's validity was ensured through a review by healthcare domain ethics expert's specialists. The questionnaires were personally administered by the researcher, facilitating a high response rate. Participants were briefed on the study's purpose and confidentiality to ensure informed consent.

3.5 Data Analysis

Quantitative data from the questionnaires were analyzed using the Statistical Package for the Social Sciences (SPSS). Analytical methods included frequency and percentage analysis to summarize demographic characteristics and mean and standard deviation to identify central tendencies and variability in participants' responses. Thematic categorization was also used to group responses related to major ethical concerns such as fairness and transparency.

3.6 Ethical Considerations

Ethical approval was obtained from the relevant authorities. The study-maintained participants' anonymity and stored data securely to protect confidentiality. Informed consent was sought from all participants, emphasizing their right to withdraw from the study at any stage.

4. Results and Discussion

The results of this study offer valuable insights into the ethical implications of AI in medicine as perceived by healthcare professionals and patients at Sane Plus Diagnostics. The findings reveal a complex and nuanced view of AI in medicine, characterized by both acceptance of its utility and significant ethical reservations. The results are organized into major themes based on the major research questions.

4.1 Demographic Data Analysis

A summary of the participants' demographic characteristics revealed a diverse sample. The majority of respondents were female (65.6%), with males comprising the remaining 34.4%. The largest age group was between 31 and 40 years old, representing nearly half of the participants. The majority of respondents were nurses and most had less than 10 years of professional experience, primarily holding a Bachelor's degree.

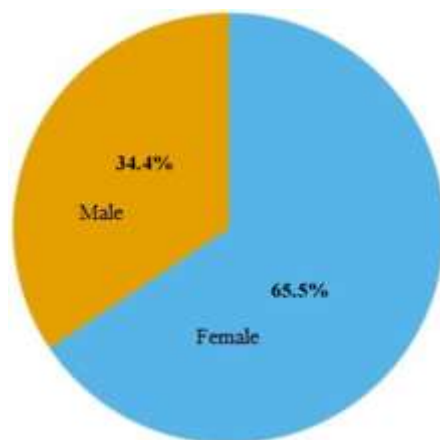


Figure 1: Gender Distribution of Respondents

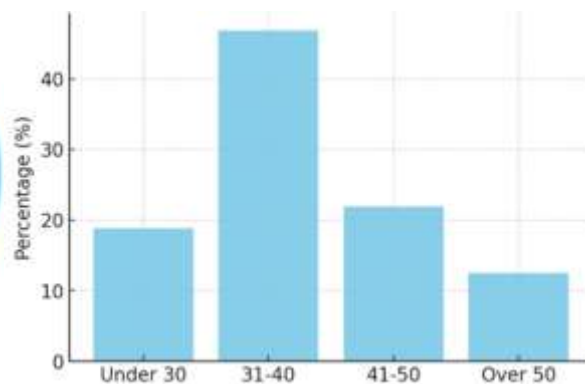


Figure 2: Age Distribution of Respondents

Figures 1 - 4 illustrate the demographic distribution of respondents, perceptions of AI in clinical practice, ethical practices among professionals, and the perceived impact of AI on professional roles. These visualizations highlight important trends, such as the dominance of female respondents (65.6%), the concentration of participants in the 31-40 years age bracket (46.9%), and the general

acceptance of AI as an augmentation tool rather than a replacement for human expertise.

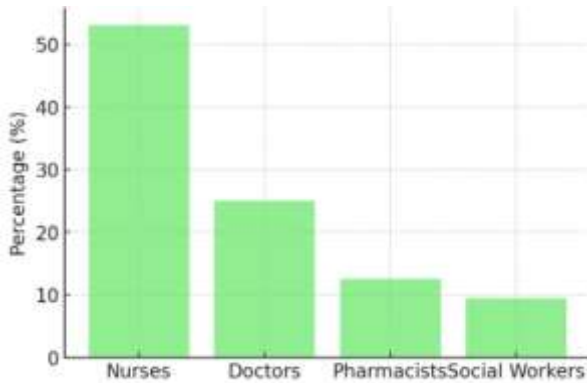


Figure 3: Professional Roles of Respondents

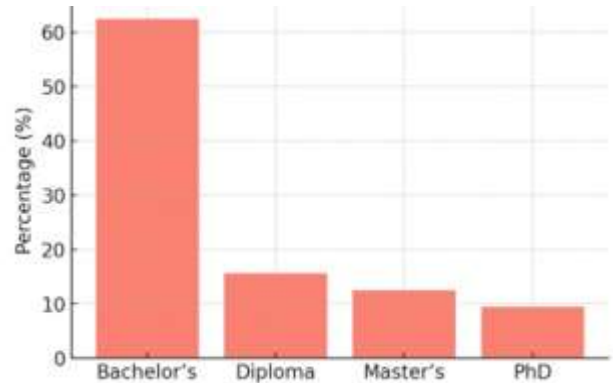


Figure 4: Educational Qualifications of Respondents

4.2 Ethical Concerns About AI in Medicine

The survey revealed mixed sentiments regarding the adoption of AI, indicating that while participants see its potential, they also harbour specific ethical concerns.

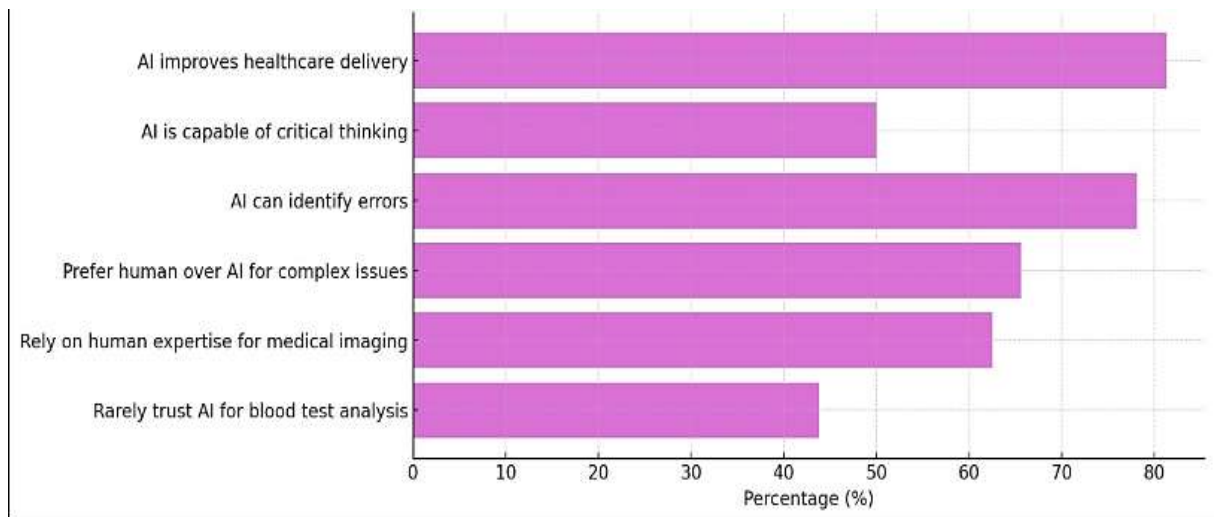


Figure 5: Perceptions of AI in Clinical Practice

A notable finding is the high level of trust in AI to identify errors (78.1%) and its perceived capability to improve healthcare delivery (81.3%) as shown in figure 5. However, this trust does not extend to full autonomy, as a significant majority of respondents (65.6%) still prefer human input for complex and psychological issues.

This highlights a fundamental tension which reveals that participants view AI as a valuable tool for augmentation and error-checking rather than a replacement for human judgment. The hesitancy to fully trust AI is particularly evident in critical diagnostic tasks, with a substantial percentage of

respondents expressing a lack of trust in AI for blood test analysis (43.8%) and a preference for human expertise in medical imaging (62.5%). This aligns with the “black box” problem identified in the literature, where the lack of transparency in AI’s decision-making process can lead to a lack of confidence and hinder trust (Modi, 2023).

4.3 Ethical Practices Among Healthcare Professionals

The results as shown in figure 6 indicate that while there is some engagement with ethical practices, there is also room for improvement. The high percentage of respondents who have received ethics training (68.8%) and who feel confident in their ethical decision-making (62.5%) suggests a foundational awareness of the topic. However, the low percentage of participants who believe reporting mechanisms for unethical behaviour are effective (31.3%) points to a significant institutional gap. This finding highlights a disconnect between individual ethical confidence and the supportive organizational structures needed to address ethical lapses. The existing literature on AI governance emphasizes that a robust framework must include mechanisms for accountability and reporting to be effective (Couture et al., 2023).

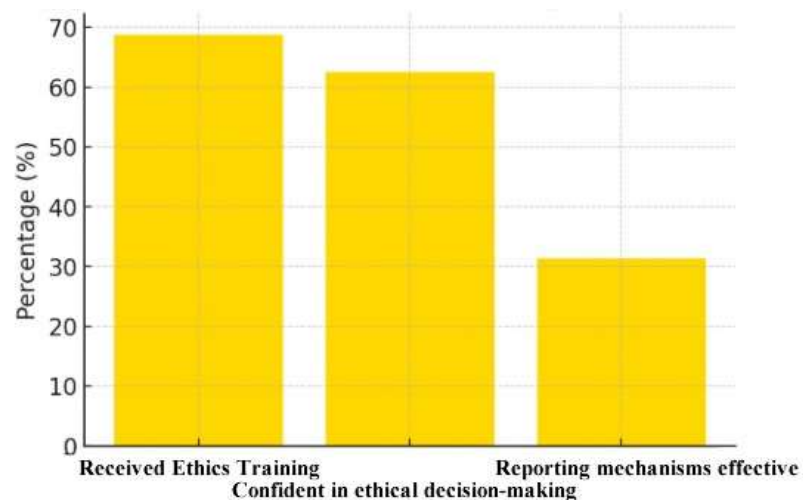


Figure 6: Ethical Practices Among Professionals

4.3 Perceptions of AI’s Impact on Professional Roles

Participants generally saw AI as a tool for workload reduction, automating repetitive tasks and allowing them to focus on patient care as shown in figure 7. However, a notable concern was the potential for skill erosion, with 43.8% of respondents expressing worry that an over-reliance on AI could diminish critical clinical skills over time. This finding corroborates the literature on the “dual impact” of AI, where its benefits are closely tied to new challenges (Ingole, 2024). The results also underscore the importance of trust and collaboration, as participants emphasized the need for

blending AI insights with human expertise, rather than ceding full control to the technology. This suggests that the future of AI in medicine is not one of full automation but rather one of human-AI collaboration.

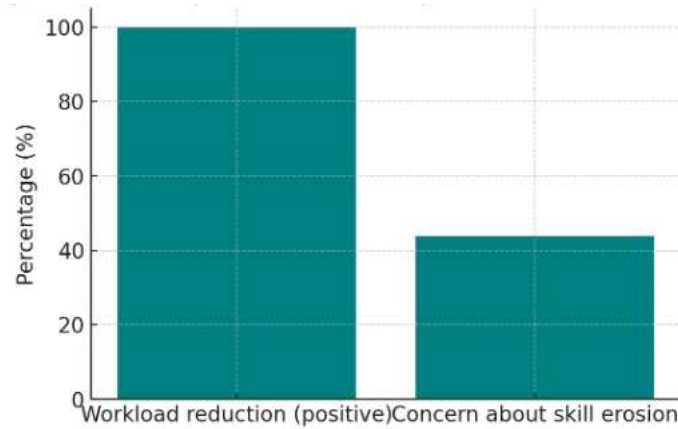


Figure 7: Perception of AI's Impact on Professional Roles

Additionally, disparities in ethical training among respondents highlight the need for standardized education on AI ethics. Preferences for human expertise in areas like diagnostics reflect concerns about potential biases in AI systems trained on non-representative datasets. While most participants had some exposure to ethics training, gaps in institutional support for reporting unethical behaviour suggest a need for clearer policies and robust ethical frameworks. The preference for human judgment in complex diagnoses (such as mental health and critical diagnostics) underscores both the need for AI systems to complement rather than replace human expertise and the irreplaceable value of empathy and nuanced decision-making in medicine.

Finally, it is worthy of mentioning here that, despite its comprehensive approach, the study faced certain limitations. The findings are based on a single healthcare institution, which limits their generalizability to other contexts. The relatively small sample size may not fully capture the diversity of perspectives within the broader healthcare sector. Additionally, the subjective nature of the survey means that participants' responses may have been influenced by personal biases or experiences with AI technologies. These limitations are acknowledged to provide a balanced interpretation of the findings and to guide future research.

5. Conclusion

The integration of AI into medicine has the potential to revolutionize healthcare by improving patient outcomes, enhancing diagnostic precision and increasing efficiency through the automation of routine tasks. This study, however, demonstrates that the realization of this potential depends on addressing significant ethical challenges. While healthcare professionals and patients acknowledge the benefits of AI, their acceptance is shaped by concerns about trust, transparency and fairness.

The findings reveal that safeguarding patient data remains one of the most pressing issues in AI adoption. To maintain confidence in AI-driven systems, healthcare institutions must implement robust governance structures and comprehensive policies that ensure confidentiality and compliance with ethical and legal standards. Equally critical is the design of AI systems capable of generating interpretable outputs. Transparency is not merely a technical feature but an ethical necessity, as it allows healthcare professionals to understand and validate AI recommendations, thereby reinforcing collaborative rather than adversarial relationships between humans and machines. The study further highlights the danger of algorithmic bias, particularly if training datasets fail to reflect the diversity of real-world populations. Unless inclusivity and rigorous bias testing are prioritized, AI risks entrenching inequities instead of correcting them.

The research also underscores the need for balance in the role of AI in healthcare. Respondents expressed confidence in AI as a supportive tool that reduces workloads and improves efficiency, but they consistently preferred human judgment in complex cases. This tension reflects the broader reality that AI should not replace clinicians but instead augment their capacity to deliver care. Preserving the human dimensions of empathy, judgment and patient-centered interaction is essential for AI to genuinely enhance, rather than diminish, healthcare delivery.

From this study, several future directions emerged. Longitudinal research is needed to examine how AI affects professional practice over time, particularly whether concerns about skill erosion are borne out in clinical reality. Further studies should also focus more directly on patients, capturing their perspectives on consent, trust and acceptance of AI tools, since patients are ultimately the beneficiaries or victims of these technologies. Comparative research across healthcare systems and countries will be essential to identify best practices for ethical governance, avoiding fragmented approaches that leave loopholes in regulation. At the technological level, sustained collaboration between developers, ethicists and clinicians must prioritize the development of explainable AI systems that are transparent, context-sensitive and responsive to the ethical complexities of medical practice.

From the foregoing, it is evident that, the responsible adoption of AI in medicine requires a proactive alignment of technological innovation with ethical principles. If the challenges of privacy, transparency, bias and accountability are carefully addressed, AI can transform healthcare into a more efficient, equitable and trustworthy system. However, if these issues are neglected, the promise of AI risks being undermined by distrust and inequity. The future of AI in medicine therefore lies not only in technological advancement but also in our collective commitment to ensuring that innovation is guided by ethics, equity, and respect for human dignity.

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