6th CoMBInES
Volume 6 No 1 (2026)

Accepted : July 11th, 2026
Published : September 30th, 2026
DOI : 10.37253/combines.v6i1.12779

Conference on Management, Business, Innovation, Education and Social Science
https://journal.uib.ac.id/index.php/combines

Readiness Gaps in Malaysia's AI Healthcare Roadmap: Education, Ethics, and Equity

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Abstract

Malaysia's National AI Roadmap (2021- 2025) has concluded, and the AI Technology Action Plan 2026–2030 names health among its top priorities. Clinical adoption of artificial intelligence (AI), however, has outpaced professional readiness. This paper reviews evidence across three linked readiness gaps: the near-absence of AI competencies in Malaysian medical curricula, conflicts of interest between clinicians and AI vendors that pharmaceutical-era disclosure rules cannot capture, and algorithmic inequity affecting communities under-represented in health data. We propose an Integrated AI Readiness Framework (IARF) that translates each gap into a specific institutional requirement: an AI-competency standard within Malaysian Qualifications Agency (MQA) accreditation, an AI-vendor conflict-of-interest clause from the Malaysian Medical Council, and an AI Health Equity Board under the Ministry of Health. Grounded in the Malaysian system, the framework is transferable to other middle-income ASEAN health systems.

Keywords: *artificial intelligence; medical education; physician–industry relationships; social resilience; healthcare governance*

Introduction

AI is already part of Malaysian clinical practice. Imaging-based decision support is being trialled in tertiary hospitals, AI triage tools operate in private clinics, and the Twelfth Malaysia Plan positions AI as a pillar of the digital economy alongside the National AI Roadmap (Chong et al., 2025; Sheng et al., 2024). What is new is not the technology but the speed: clinical adoption has outpaced curriculum reform, ethical guideline revision, and equity governance. This paper asks what should be done about that gap.

Three linked problems define it. The first concerns medical curricula: Malaysian medical schools have been slow to include AI competencies in MBBS and MD programmes, even though today's

graduates will almost certainly encounter AI-assisted diagnostics in their postings. The second concerns conflicts of interest. AI diagnostic and decision-support vendors operate differently from pharmaceutical companies: software updates can change an algorithm's recommendations, training data is a commercial asset rather than a public scientific document, and the clinician-vendor financial relationship is rarely a one-off transaction. Malaysia's existing physician–industry ethics framework, written mainly for pharmaceutical sponsorship, was not designed for this complexity. The third concerns equity: algorithms trained on majority-population datasets produce errors for the populations they were not trained on — in Malaysia, Orang Asli communities, migrant-worker cohorts, and rural districts of Sabah and Sarawak where health-record digitisation is uneven. If governance does not address this before deployment scales, AI will widen these gaps rather than close them.

This paper reviews the three literatures and builds toward a single proposal, the Integrated AI Readiness Framework (IARF), which turns each problem into a concrete institutional requirement.

Literature Review

AI literacy in medical education.

A systematic review and meta-analysis pooling 22 studies and 8,491 participants across medical, dental, and nursing programmes found AI knowledge at only 0.44 (95% CI 0.34 - 0.54), while attitudes were considerably more favourable at 0.65 (95% CI 0.55 - 0.75) (Amiri et al., 2024). Students recognise that AI matters to their careers but have not been given the literacy to appraise an algorithm's output at the bedside: attitude has run ahead of competence. A global cross-sectional survey of 4,596 students across 192 faculties in 48 countries similarly reported that 76.3% completed their education with no AI coursework at all (Busch et al., 2024). Malaysia mirrors these findings: the Malaysia Education Blueprint 2015–2025 flags digital skills and national initiatives target large-scale AI upskilling (MIDA, 2025), yet medical schools have moved more slowly than the wider higher-education sector, and Southeast Asian faculties remain under-represented in this literature (Busch et al., 2024).

Physician–industry relationships in the AI era.

Financial relationships between physicians and industry have been studied mainly for pharmaceuticals and medical devices. Malaysian evidence shows that public and student perceptions of these relationships rest on trust, transparency, and visible regulation (Kaur, 2019). AI vendors do not fit the traditional model: an AI tool's clinical logic is often opaque even to the clinician using it (Giordano et al., 2021), and the algorithm's reasoning is a vendor asset rather than a public document. Disclosure-based governance, which assumes the prescriber understands the product, therefore breaks down. The American Medical Association's FAVES principles: Fair, Appropriate, Valid, Effective, Safe, offer the closest starting point (AMA, 2024), but were built for high-income contexts and require regional adaptation rather than direct adoption.

Social resilience and AI governance.

Social resilience, a community's capacity to retain access to essential services through disruption, now occupies a central place in health-AI governance. Algorithmic bias is the mechanism by which deployment can widen existing gaps: it enters when training data under-represents a population or fails to model socioeconomic stratification. In Malaysia this concerns Orang Asli communities, migrant workers (largely Indonesian, Bangladeshi, and Nepali), and rural Sabah and Sarawak, where digitisation is uneven; most clinical AI on the global market is trained on populations bearing little resemblance to these groups. The National Academies' 2025 Watch List identifies regulatory lag as the overarching problem (NASEM, 2025), compounded in middle-income systems by thinner regulatory capacity and the

absence of nationally representative validation datasets. Social resilience therefore cannot be retrofitted after deployment; it must be a build-time requirement.

Review Methodology

This study is a narrative review of peer-reviewed literature, policy documents, and institutional reports published between 2019 and 2026. Searches in PubMed, Scopus, and Google Scholar combined the keywords "artificial intelligence", "medical education", "physician-industry relationships", "social resilience", "healthcare governance", and "Malaysia". Malaysian policy documents: the National AI Roadmap 2021 – 2025 (MOSTI, 2021), the AI Technology Action Plan 2026 – 2030, the Malaysia Education Blueprint 2015-2025 (Ministry of Education, 2015), and the Health White Paper 2023. were analysed alongside the academic literature. A narrative format was chosen because the three themes draw on different evidence bases including medical-education research, bioethics, and health-policy analysis and a systematic structure would have imposed artificial boundaries between them.

Results

The same pattern emerges across all three literatures: deployment has outpaced preparation. Partial responses exist, a curriculum module in one faculty, an ethics opinion from a professional body, an equity audit in a pilot project, but no single Malaysian framework coordinates them. The IARF is proposed to do so through three prongs, each assigning one gap to one institution.

Curriculum reform (MQA).

Medical schools should add AI literacy modules that go beyond awareness to cover critical appraisal of algorithmic outputs, data-governance principles, and structured exposure to clinical scenarios in which AI is best used. The route to scale is the Malaysian Qualifications Agency: embedding an AI-competency standard within programme accreditation criteria would make adoption non-optional across accredited medical schools. Demand-side readiness already exists: attitudinal favourability stands at 0.65 (Amiri et al., 2024); the constraint is curricular infrastructure and enforcement, not student interest.

Ethical governance of physician–AI vendor relations (Malaysian Medical Council).

Existing physician–industry guidelines should be extended to AI vendors with clear rules in three areas: transparency (patients should know when an algorithm-derived recommendation informs their care; disclosure (any financial relationship between a clinician and an AI vendor, direct or indirect, recurring or one-off, must be declared) and liability (professional responsibility must be answerable when a clinical decision informed by AI output proves wrong). The FAVES framework offers the nearest template (AMA, 2024) but requires Malaysian adaptation rather than direct adoption.

Equity as a build-time requirement (Ministry of Health).

Before any clinical rollout, AI deployment should require an equity impact assessment covering Orang Asli, migrant-worker, and rural-population sub-groups; mandatory auditing of deployed algorithms against demographic data representative of the Malaysian population, which means commissioning local datasets rather than assuming they exist; and structured community engagement with the populations most likely to be affected. A standing AI Health Equity Board under the Ministry of Health, with seats for affected communities, rural-district practitioners, and civil society, should convene before vendor procurement, not after.

Conclusion

There is a window, and it will not stay open long. The first National AI Roadmap has concluded and the next ten-year plans are being drafted; how curriculum, ethics, and equity reforms are sequenced over the coming eighteen months will shape whether the resulting system is genuinely strong or merely digitally stamped. The risk is institutional rather than technological: a healthcare system that is digitally advanced but structurally weaker for the populations it already served badly. Curriculum, ethics, and equity are not three independent decisions for three agencies; they are facets of one readiness question, which the IARF makes visible to the MQA, the Malaysian Medical Council, and the Ministry of Health respectively.

Three empirical studies follow naturally from this framework: a baseline survey of AI curriculum integration across MQA-accredited Malaysian medical schools; a longitudinal cohort study of clinician–AI vendor financial relationships as the market matures; and a community-led equity audit of AI tools deployed in Ministry of Health facilities, with affected community organisations co-designing the audit instrument. The evidence base for AI in Malaysian healthcare remains incomplete, but waiting for completeness hands the implementation timeline to vendors: a luxury middle-income health systems cannot afford.

References

- American Medical Association (AMA). (2024). Augmented intelligence in health care (H-480.939). Chicago: AMA.
- Amiri, H., Peiravi, S., Rezazadeh Shojaee, S. S., et al. (2024). Medical, dental, and nursing students' attitudes and knowledge towards artificial intelligence: A systematic review and meta-analysis. BMC Medical Education, 24(1), 412. https://doi.org/10.1186/s12909-024-05406-1
- Busch, F., Hoffmann, L., Truhn, D., et al. (2024). Global cross-sectional student survey on AI in medical, dental, and veterinary education and practice at 192 faculties. BMC Medical Education, 24(1), 1066. https://doi.org/10.1186/s12909-024-06035-4
- Chong, P. L., Vaigeshwari, V., Mohammed Reyasudin, B. K., et al. (2025). Integrating artificial intelligence in healthcare: Applications, challenges, and future directions. Future Science OA, 11(1), 2527505. https://doi.org/10.1080/20565623.2025.2527505
- Giordano, C., Brennan, M., Mohamed, B., et al. (2021). Accessing artificial intelligence for clinical decision-making. Frontiers in Digital Health, 3, 645232. https://doi.org/10.3389/fdgth.2021.645232
- Kaur, A. (2019). A question of trust: Malaysians' perceptions of financial relationships between physicians and medical manufacturing industry [MBA thesis]. Universiti Tunku Abdul Rahman.
- Malaysian Investment Development Authority (MIDA). (2025). AI in education driving Malaysia's future-ready workforce. https://www.mida.gov.my
- Ministry of Education Malaysia. (2015). Malaysia Education Blueprint 2015–2025 (Higher Education). Putrajaya: Ministry of Education.
- Ministry of Science, Technology and Innovation (MOSTI). (2021). Malaysia National Artificial Intelligence Roadmap 2021–2025. Putrajaya: MOSTI.
- National Academies of Sciences, Engineering, and Medicine (NASEM). (2025). 2025 watch list: Artificial intelligence in health care. Washington, DC: The National Academies Press.

- Sheng, B., Pushpanathan, K., Guan, Z., et al. (2024). Artificial intelligence for diabetes care: Current and future prospects. The Lancet Diabetes & Endocrinology, 12(8), 569–595. https://doi.org/10.1016/S2213-8587(24)00154-2