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Strengthening Educational Capacity for an Ultra-Aging Society: Structural Conditions for High-Risk Pediatric and Neonatal Nursing

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Abstract

Background: *Japan's ultra aging demographic trajectory, combined with rising numbers of technology dependent children and persistent nursing shortages, has intensified the demand for advanced pediatric and neonatal competencies. These pressures expose structural gaps in clinical training, particularly for extremely preterm infants born at 22–24 weeks of gestation.*

Objective: *This study examines how demographic change, policy reform, and ethical orientations shape the capacity of Japan's healthcare education system to prepare nurses for high risk pediatric and neonatal care. It also investigates the structural conditions required for developing advanced clinical competencies and considers how educational investment can strengthen training environments beyond the limits of traditional workplace based learning.*

Methods: *Using a five lens analytical framework, we analyze demographic projections, policy reforms, neonatal ethics, and educational capacity. National data from Japan—including trends in technology dependent children, the expansion of nursing universities, and the 2025 revision of the Model Core Curriculum—are integrated to contextualize structural challenges.*

Results: *Demographic decline and delayed childbearing have increased the prevalence of technology dependent children, while home care reimbursement policies have shifted complex procedures to families. International differences in neonatal resuscitation reveal ethical divergence: many countries restrict treatment before 24 weeks, whereas Japan commonly initiates resuscitation at 22 weeks. Substantial variation in "survival without impairment" across institutions indicates that outcomes depend heavily on training quality. However, workplace based learning opportunities are unpredictable, ethically constrained, and unevenly distributed, limiting the development of high risk competencies.*

Conclusion: *Strengthening educational capacity—including structured training environments, faculty development with rich clinical experience, and high quality simulation resources—is essential for ensuring that ethical commitments in neonatal and pediatric care can be delivered consistently and safely in an ultra aging society.*

Introduction

Japan is entering an unprecedented phase as one of the world's most rapidly advancing ultra aging societies (Katori, 2024). Declining fertility, delayed childbearing, and a shrinking workforce have intensified pressures on healthcare delivery, particularly in domains requiring continuous, specialized, and high risk care. One of the clearest manifestations of these demographic shifts is the rapid increase in technology dependent children, whose complex needs demand advanced pediatric and neonatal competencies. National data show that the number of children reliant on medical devices has doubled within 15 years, underscoring the widening gap between clinical demands and the capacity of the healthcare workforce (Seiiku Child Think Tank, 2023).

These demographic pressures expose structural vulnerabilities in Japan's nursing education system. Traditional workplace based learning—long regarded as the foundation of clinical training—faces inherent limitations in high risk pediatric and neonatal care, where opportunities to learn from real cases are unpredictable, ethically constrained, and unevenly distributed across institutions (Holt et al., 2024; Mani, 2025). As a result, the competencies required to care for extremely preterm or technology dependent children cannot be reliably developed through situated learning alone.

At the same time, policy reforms have expanded home care reimbursement, promoted task sharing, and revised

national curricula in an effort to sustain healthcare delivery. The introduction of reimbursement for home mechanical ventilation management in 1990 marked an early institutional shift toward supporting technologically assisted care in the home (Zaitakuiryo Network, 2000), laying the foundation for subsequent expansions in pediatric home based respiratory management. Yet these reforms have consistently assumed a level of educational capacity that many institutions are not equipped to provide. Without sufficient investment in structured training environments, faculty development, and high-quality simulation resources, policy initiatives risk becoming symbolic rather than transformative.

This study examines how demographic change, policy reform, technological innovation, and ethical orientations shape the capacity of Japan's healthcare education system to prepare nurses for high-risk pediatric and neonatal care. It also investigates the structural conditions required for developing advanced clinical competencies and considers how educational investment can strengthen training environments beyond the limits of traditional workplace-based learning. Understanding how Japan's ultra-aging trajectory intersects with rising pediatric complexity provides the foundation for analyzing why educational capacity has become a critical determinant of policy implementation, workforce preparedness, and the ethical coherence of neonatal and pediatric care.

Background: Demographic, Structural, and Policy Pressures

Japan's demographic transformation is reshaping the landscape of healthcare demand in ways that directly affect the preparation of the nursing workforce. Fertility decline, delayed childbearing, and rapid population aging have produced a shrinking pool of working age adults alongside a growing number of individuals requiring complex, long term care. These pressures are particularly visible in pediatric and neonatal services, where the number of technology dependent children has doubled within 15 years, reflecting a growing population of infants and children who require continuous respiratory support, medical devices, and highly specialized nursing care (Seiiku Child Think Tank, 2023). Yet opportunities for students and novice nurses to acquire these competencies remain limited.

Comparative demographic data further highlight the severity of Japan's situation. South Korea faces a similar trajectory, with its working age population projected to fall from 71% to 53.2% by 2050, while the United States—despite its own workforce shortages—maintains a more stable demographic profile (UN DESA, 2024; OECD, 2023; Statistics Korea, 2023). These contrasts underscore the urgency for Japan to strengthen its educational infrastructure, as the country cannot rely on population growth or workforce expansion to meet rising care demands.

At the same time, persistent nursing shortages and the global problem of missed nursing care reveal structural vulnerabilities in the healthcare system. Missed nursing care—defined as required nursing activities that are omitted, delayed, or incompletely performed—has been consistently linked to workforce shortages, high patient acuity, and inadequate institutional support (Chaboyer et al., 2021). These pressures are compounded by the limitations of workplace based learning, which remains the dominant model of clinical education in Japan. Situated learning assumes that students acquire competence through immersion in real clinical environments, yet evidence shows that such learning is feasible only when opportunities are predictable, adequately supervised, and pedagogically structured—conditions that are rarely met in high risk pediatric and neonatal care (Gonen et al., 2016). The unpredictability of clinical opportunities, combined with ethical constraints and institutional variability, limits the effectiveness of workplace based learning as the primary mode of skill acquisition. These constraints are especially consequential in high risk pediatric and neonatal care, where the competencies required are both low frequency and high stakes. These demographic and structural pressures intersect with a longer policy trajectory in which Japan has repeatedly attempted to sustain healthcare delivery by expanding nursing roles and shifting complex care into the home. The introduction of reimbursement for home mechanical ventilation management in 1990 marked an early institutional shift toward supporting technologically assisted care outside hospital settings (Zaitakuiryo Network, 2000). Subsequent reforms—including the expansion of home care reimbursement, task sharing initiatives, and the establishment of the Specific Procedure Training Course System in 2015—further redistributed clinical responsibilities to nurses (Colley et al., 2020). Most recently, the 2025 revision of the Model Core Curriculum incorporated advanced pediatric content and home care procedures in an effort to align education with evolving clinical demands (JANPU, 2025).

Despite their ambitions, these reforms have consistently assumed a level of educational capacity that many institutions are not equipped to provide. Universities often lack faculty with advanced pediatric expertise, have limited access to high quality simulation resources, and face constraints in providing supervised practice opportunities. As a result, policy reforms have repeatedly outpaced the educational infrastructure required to implement them effectively.

Taken together, these demographic, structural, and policy pressures form the backdrop against which educational capacity must be evaluated. As the demand for advanced pediatric and neonatal competencies grows, the ability of nursing universities to provide structured, equitable, and high quality training becomes a central determinant of healthcare system sustainability in an ultra aging society. Understanding this historical and structural context is essential for explaining why educational investment has become a critical prerequisite for policy implementation, workforce preparedness, and the ethical coherence of neonatal and pediatric care.

Analytical Framework

This study employs an integrative analytical framework consisting of five lenses:

1. Demographic structural,
2. Political economic,
3. Technological pedagogical,
4. Educational institutional, and
5. Ethical cultural.

The framework builds on earlier policy analysis of Japanese nursing reform (Colley et al., 2020), which applied Walt and Gilson's Policy Triangle to examine how context, content, process, and actors shape policy outcomes. As summarized by Gary et al. (2020), the Policy Triangle highlights that policy implementation is influenced not only by the substance of reforms but also by the institutional and sociopolitical environments in which they unfold. By situating current challenges within this longer policy trajectory, the framework clarifies how demographic pressures, regulatory reforms, technological change, and ethical orientations interact to influence the future of high risk pediatric care.

1. Demographic Structural Lens

The demographic structural lens highlights how Japan's unprecedented population aging and declining fertility have created a widening gap between healthcare needs and the labor force available to meet them. Japan and South Korea are among the fastest aging societies in the world, with rapidly shrinking working age populations and rising numbers of individuals requiring complex, long term care (UN DESA, 2024; OECD, 2023; Statistics Korea, 2023, Table 1). These demographic shifts are especially consequential in pediatric and neonatal services, where the number of technology dependent children in Japan has doubled within 15 years, signaling a growing demand for advanced respiratory and device assisted care (Seiiku Child Think Tank, 2023, Figure 1). As shown in international demographic projections, Japan's workforce contraction is far more severe than that of countries such as the United States, underscoring the structural constraints within which healthcare education must operate.

Table 1 : Demographic comparison of Japan, South Korea, and the United States.
Note: Data compiled from
UN World Population Prospects 2024 (age specific projections),
OECD Health Statistics 2023 (nursing workforce data), and
Statistics Korea (KOSTAT) Special Population Projections 2023.

Indicators	Country	Current	2035 (Proj.)	2050 (Proj.)
Working-Age Population (%) (Ages 15-64)	South Korea	70.9%	59.1%	53.2%
	Japan	59.0%	57.6%	52.9%
	USA	64.7%	63.0%	57.8%
Elderly Population (%) (Ages 65+)	South Korea	19.1%	30.1%	40.1%
	Japan	29.4%	32.3%	37.7%
	USA	17.9%	21.0%	23.0%
Nurses per 1,000 inhabitants (Nurse Density)	South Korea	9.1	-	-
	Japan	12.18	-	-
	South Korea	12.71	-	-

This lens establishes the foundational problem: demographic change is not simply increasing the volume of care required but is fundamentally altering its complexity. High risk pediatric and neonatal care requires competencies that are both low frequency and high stakes, yet opportunities to acquire these skills through traditional clinical exposure are limited. The demographic structural lens therefore clarifies why educational capacity—not workforce expansion alone—has become a critical determinant of system sustainability in an ultra aging society.

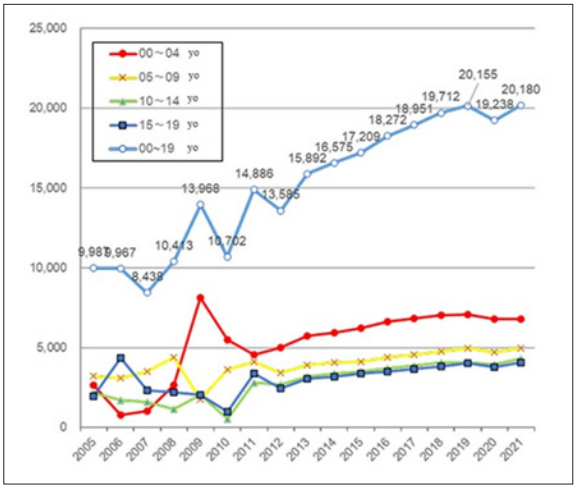

Figure 1: Trends in technology dependent children in Japan, 2005–2021.
Seiiku Child Think Tank (2023). Technology-dependent children trends
https://www.ncchd.go.jp/center/activity/kodomo_thinktank/pr/ima01.pdf.

2. Political Economic Lens

The political economic lens examines how Japan has attempted to sustain healthcare delivery amid demographic decline through regulatory and fiscal reforms. Since the introduction of reimbursement for home mechanical ventilation management in 1990, policy initiatives have progressively expanded home care systems, promoted task sharing, and broadened the scope of nursing practice. More recent reforms—including the Specific Procedure Training Course System (2015) and the 2025 revision of the Model Core Curriculum—reflect a continued effort to align nursing roles with rising clinical complexity (Colley et al., 2020; JANPU, 2025).

A defining feature of the 2025 curriculum revision is its shift from a knowledge based to a competency based framework, signaling policy expectations that graduates will be prepared to perform complex clinical tasks from the outset of practice (JANPU, 2025). However, competency based education presupposes robust institutional capacity, including structured simulation environments, faculty with advanced pediatric expertise, and opportunities for supervised practice—resources that remain unevenly distributed across universities.

Walt and Gilson's Policy Triangle, as articulated in their seminal 1994 work and later summarized by Gary et al. (2020), conceptualizes health policy as the product of dynamic interactions among context, content, process, and actors. This framework emphasizes that policy outcomes cannot be understood solely by examining the reform itself; rather, they emerge from the sociopolitical environment in which policies are negotiated, the institutional capacities of implementing organizations, and the interests and power relations among stakeholders. In Japan, fragmented governance structures, fiscal constraints, and persistent nurse shortages constrain the ability of universities and training institutions to respond effectively to policy reforms. Consequently, political–economic initiatives often advance more rapidly than the educational and organizational infrastructure required to sustain them, producing a structural misalignment between policy ambition and institutional readiness. This gap becomes particularly salient in areas such as the increasing number of children requiring medical care and the rapid introduction of technologies—including nursing XR simulators and AI-driven tools—that demand new competencies and coordinated policy support for successful integration.

3. Technological Pedagogical Lens

The technological pedagogical lens examines how digital transformation, simulation based education, and artificial intelligence (AI) have been positioned as strategic responses to the demographic and political economic pressures facing Japan's healthcare system. As workforce shortages intensify and the clinical demands associated with high risk pediatric and neonatal care become increasingly complex, policymakers have increasingly framed technological innovation as a structural mechanism for sustaining service delivery. This orientation has been reinforced by Japan's 2025 AI Act, which designates AI as an essential instrument for supporting critical public services, including healthcare.

Within healthcare education, simulation based learning—encompassing digital, low fidelity, and high fidelity modalities—has emerged as a central pedagogical strategy for developing competencies that cannot be reliably acquired through workplace based learning alone. High risk pediatric and neonatal procedures are both low frequency and high stakes, and opportunities for supervised clinical exposure are unpredictable, ethically constrained, and unevenly distributed across institutions. In this context, extended reality (XR) technologies have gained prominence for their ability to provide immersive, repeatable, and psychologically safe learning environments that support the development of psychomotor skills, situational awareness, and clinical judgment (Fealy et al., 2023). Advances in rule based and adaptive XR systems further demonstrate the potential for technology to standardize training quality across institutions and reduce disparities in access to high quality learning experiences (Evgenikos et al., 2025).

AI enabled simulation is also expanding rapidly. Generative AI can produce dynamic, context responsive virtual scenarios that adapt to learner performance, offering new possibilities for personalized and scalable training (Rahimi et al., 2025). Parallel interdisciplinary initiatives integrating AI, wearable devices, and data driven feedback illustrate the growing feasibility of technologically enhanced curricula and highlight the need for collaborative instructional design and faculty development (Integlia et al., 2022).

Importantly, these technological innovations are no longer peripheral enhancements but are increasingly functioning as structural enablers of competency based education. The 2025 revision of the Model Core Curriculum signals a national expectation that graduates will be prepared to perform complex clinical tasks from the outset of practice (JANPU, 2025). XR and AI systems expand the feasibility of this policy shift by providing structured, high quality learning opportunities that are less dependent on institutional resources, clinical case availability, or geographic location. As a result, the policy ambition of producing practice ready graduates is becoming more attainable through technological innovation.

However, the transformative potential of these technologies depends on the institutional capacity to integrate them effectively. Faculty with advanced pediatric expertise, adequate simulation infrastructure, and protected time for curriculum development remain essential for ensuring that XR and AI systems are pedagogically meaningful rather than merely technical additions. Thus, technological innovation not only supplements existing educational capacity but also serves as a catalyst for reconfiguring the structural foundations of nursing education in an ultra aging society.

4. Educational Institutional Lens

The educational institutional lens highlights how the capacity of universities and training institutions fundamentally shapes the feasibility of competency based education in neonatal and pediatric care. While policy reforms increasingly expect

graduates to perform complex, low frequency procedures from the outset of practice, the ability of institutions to meet these expectations remains uneven. Many universities lack faculty with advanced pediatric expertise, protected time for curriculum development, and the infrastructure required to deliver high quality simulation based education (Danan, 2025, Galic et.al. 2025)

Recent literature underscores that extended reality (XR), virtual reality (VR), and cloud based adaptive learning systems are not optional enhancements but essential components of modern clinical education. XR enabled environments provide immersive, repeatable, and psychologically safe learning spaces that support the acquisition of complex psychomotor and decision making skills (Emma, 2026). Cloud based VR/AR platforms further expand institutional capacity by enabling scalable and remotely accessible simulation experiences, reducing dependence on physical facilities and allowing learners to practice high risk procedures in controlled digital environments (Oyekunle et al., 2024).

Strengthening educational capacity therefore requires sustained investment in simulation infrastructure, faculty development, and the recruitment and retention of clinically experienced educators. Evidence shows that the successful integration of AI enabled and XR based learning environments depends on educators who can design, facilitate, and evaluate technology enhanced curricula (Integlia et al., 2022). Competitive compensation, protected teaching time, and expanded professional autonomy are essential for retaining expert clinicians in academic roles—conditions that directly influence the quality and equity of neonatal and pediatric training.

These institutional requirements are not merely operational considerations but structural determinants of healthcare quality. Without adequate infrastructure and faculty expertise, even advanced XR and AI systems cannot compensate for the limitations of traditional clinical exposure. Ensuring equitable, high quality care in an ultra aging society therefore depends on sustained investment in the educational institutions responsible for preparing the next generation of neonatal and pediatric nurses.

5. Ethical Cultural Lens

Ethical and cultural orientations play a decisive role in shaping expectations for neonatal and pediatric care, particularly in cases involving extremely preterm infants. International variation in treatment thresholds illustrates this clearly. Many European countries adopt a cautious stance toward resuscitation before 24 weeks of gestation, reflecting ethical frameworks that emphasize viability, long term outcomes, and the prevention of suffering (Wilkinson & Stenson, 2023; Nuffield Council on Bioethics, 2006). In contrast, Japan commonly initiates resuscitation at 22 weeks, grounded in cultural norms that prioritize life preservation, parental expectations for maximal intervention, and a societal commitment to offering every possible chance of survival (Seri & Evans, 2008). These differing ethical orientations shape not only clinical decision making but also the competencies expected of healthcare professionals.

When a society adopts an interventionist approach, as in Japan, nurses must be prepared to manage highly complex and low frequency procedures from the earliest stages of life. However, the ability to meet these expectations depends on the availability of structured training environments that ensure consistent exposure to the necessary skills. XR based simulation has been identified as a promising tool for promoting diversity, equity, and inclusion (DEI), enabling learners to engage with a wider range of patient scenarios—including those involving children and adults with disabilities—and supporting more equitable preparation for complex care (Colley, 2024). Such environments help counteract representational gaps in clinical placements and allow learners to practice ethically sensitive communication and decision making in psychologically safe settings.

At the same time, sociocultural research highlights the limitations of situated learning in clinical environments. Holt et al. (2024) demonstrate that much of what experienced clinicians do is grounded in tacit knowledge—subtle judgments, embodied practices, and context specific cues that are rarely verbalized. For novice learners, these forms of knowledge remain largely invisible, making it difficult to understand or replicate expert performance. In high risk neonatal care, where clinical cues are subtle and consequences severe, the invisibility of tacit knowledge creates significant barriers to safe skill acquisition.

These challenges are compounded by the global problem of missed nursing care. As Chaboyer et al. (2021) show, omissions and delays in required nursing activities are strongly associated with insufficient training, inadequate staffing, and high patient acuity. When nurses enter practice without sufficient opportunities to develop essential competencies—particularly in low frequency, high stakes neonatal procedures—patient safety is jeopardized. Ethical commitments to nonmaleficence and justice therefore require educational systems to ensure that all learners, regardless of institutional resources, have access to structured, high quality training environments.

Finally, ethical orientations intersect with structural inequalities(ANA,2022; Keebone, 2023). Variability in outcomes for extremely preterm infants across institutions demonstrates that ethical commitments to equity and justice cannot be realized without consistent, high quality training environments. When educational capacity differs across regions or institutions, so too does the quality of care, producing ethically consequential disparities. Ethical coherence in neonatal and pediatric care therefore depends fundamentally on the technical and institutional capacity to deliver it—making educational investment not only a structural or pedagogical concern but an ethical imperative in an ultra aging society.

Conclusion

Japan's ultra aging demographic trajectory and the growing number of technology dependent children have created structural pressures that cannot be addressed through policy reform alone. Across demographic, political economic, technological, institutional, and ethical cultural lenses, this study shows that educational institutions are not merely sites of implementation but structural determinants of whether policy goals can be realized in practice. Ethical coherence in neonatal and pediatric care ultimately depends on the technical and institutional capacity to deliver it. Strengthening educational capacity requires investment in simulation infrastructure, sustained faculty development, and the recruitment and retention of clinically experienced educators through competitive compensation, protected teaching time, and expanded professional autonomy. These conditions are essential for ensuring equitable, high quality care in an ultra aging society.

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References

1. American Nurses Association. (2022). The ethical use of artificial intelligence in nursing practice. ANA Center for Ethics and Human Rights. https://www.nursingworld.org/globalassets/practiceandpolicy/nursing-excellence/ana-position-statements/the-ethical-use-of-artificial-intelligence-in-nursing-practice_bod-approved-12_20_22.pdf
2. Chaboyer, W., Harbeck, E., Lee, B.-O., & Grealish, L. (2021). Missed nursing care: An overview of reviews. Kaohsiung *Journal of Medical Sciences, 37*(1), 82–91. https://doi.org/10.1002/kjm2.12308
3. Colley, N. (2024). Nursing XR simulator for diversity, equity, and inclusion: A new purpose of future technology-development. In Lifelong learning—Education for the future world. IntechOpen.
4. Colley, N., Nakamura, M., & Cashin, A. (2020). A policy analysis of the "specific procedure training course system": A challenge for professional lifelong learning. High education journal, 27, 1–11.
5. Dornan, M. (2025). Every nurse an AI nurse: A framework for integrating artificial intelligence across nursing practice, education, research and policy. Digital Health, 11, 20552076251377939.
6. Douglas, SM., & Dahnke, MD (2018). Creating an ethical environment for parents and health providers dealing with the treatment dilemmas of neonates at the edge of viability. *Journal of Neonatal Nursing, 19*(1), 33-37.
7. Emma, O. (2026). Extended reality in the digital age: A literature review on technology-driven learning environments. Computers & Education: X Reality, 8, 100127.
8. Evgenikos, K., Troussas, C., Stavropoulou, A., & Papageorgiou, D. (2025). Design of a rule-based XR simulation tool integrating e-health and human–computer interaction for critical care nursing education. In Novel & Intelligent Digital Systems Conferences (pp. 25–34). Springer Nature Switzerland.
9. Fealy, S., Irwin, P., Tacgin, Z., See, Z. S., & Jones, D. (2023). Enhancing nursing simulation education: A case for extended reality innovation. Virtual Worlds, 2(3), 218–230.
10. Galić, I., Habijan, M., Benčević, M., Perić, J., Leventić, H., Romić, K., & Vujnovac, M. (2025). Advancing medical education and planning through extended reality: A mini review of XR applications in medicine. In International Conference on Digital Transformation in Education and Artificial Intelligence Application (pp. 268–282). Springer Nature Switzerland.
11. Gary, L. O., Sinnott, S.-J., Walshe, V., Mulcahy, M., & Byrne, S. (2020). Health policy triangle framework: Narrative review of the recent literature. Health Policy OPEN, 1, 100016.
12. Gonen, A., Lev-Ari, L., Sharon, D., & Amzalag, M. (2016). Situated learning: The feasibility of an experimental learning of information technology for academic nursing students. Cogent Education, 3(1), 1154260.
13. Holt, S. L., Mason, J., Farrell, M., Corrigan, R. H., & Warman, S. (2024). Exploring the sociocultural experiences of student veterinary nurses in the clinical learning environment through the lens of situated learning theory. Veterinary Record, e3956.
14. Integlia, R., Chatterjee, P., & Gilmore, J. (2022, March). Collaborative course development for applications of artificial intelligence and wearable devices in healthcare. In Proceedings of the 2022 ASEE Southeast Section Conference (pp. 13–15).
15. JANPU. (2025). The 2025 revision of the Model Core Curriculum. https://www.janpu.or.jp/core-curriculum/
16. Katori, T. (2024). Japan's healthcare delivery system: From its historical evolution to the challenges of a super-aged society. Global Health & Medicine, 6(1), 6–12. https://www.jstage.jst.go.jp/article/ghm/6/1/6_2023.01121/_pdf
17. Kneebone, R. (2003). Simulation in surgical training: Educational issues and practical implications. Medical Education, 37(3), 267–277.
18. Mani, Z. A. (2025). Transitioning to competency-based education in nursing: A scoping review of curriculum review and revision strategies. BMC Nursing, 24, 1111.
19. Nuffield Council on Bioethics. (2006). Critical care decisions in fetal and neonatal medicine: Ethical issues. Nuffield Council on Bioethics. https://www.nuffieldbioethics.org/publications/critical-care-decisions
20. OECD. (2023). OECD health statistics 2023. https://www.oecd.org/health/health-data.htm

21. Oyekunle, D., Claude, B. E. A., Waliu, A. O., Adekunle, T. S., & Matthew, U. O. (2024). Cloud-based adaptive learning system: Virtual reality and augmented reality assisted educational pedagogy development on clinical simulation. Journal of Digital Health, 49–62.
22. Rahimi, F., Sadeghi-Niaraki, A., & Choi, S. M. (2025). Generative AI meets virtual reality: A comprehensive survey on applications, challenges, and future direction. IEEE Access.
23. Seiiku Child Think Tank. (2023). Technology-dependent children trends. https://www.ncchd.go.jp/center/activity/kodomo_thinktank/pr/ima01.pdf
24. Seri, I, Evans, J., (2008), Limits of viability: definition of the gray zone. Journal of Perinatology, 28 (2008), 54-58.
25. Statistics Korea. (2023). Special population projections for Korea: 2023 revision. https://kostat.go.kr
26. United Nations, Department of Economic and Social Affairs, Population Division. (2024). World population prospects 2024: Age-specific population projections. https://population.un.org/wpp/
27. Walt, G., & Gilson, L. (1994). Reforming the health sector in developing countries: The central role of policy analysis. Health Policy and Planning, 9(4), 353–370.
28. Wilkinson, D., & Stenson, B. (2023). International variation in resuscitation thresholds for extremely preterm infants. Seminars in Fetal and Neonatal Medicine, 28(4), 101–118. https://doi.org/10.1016/j.siny.2023.101118
29. Zaitakuiryo Network. (2000). Geriatric medicine. http://www.zaitakuiryo.or.jp/zaitaku/files/kaisetsu/006.html
30. e-Gov search (2025). AI Law. Act on the development of an appropriate environment for the use of artificial intelligence. https://laws.e-gov.go.jp/law/507AC0000000053