INNOVATING FOR HEALTH AND WEALTH:
PATHWAYS TO PURPOSEFUL PROGRESS

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Health, Wealth, and Laws: Why All Three Matter for a Better Future

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Abstract
This chapter explores the intricate interplay between health systems, economic structures, and legal frameworks, emphasizing their combined importance in fostering equitable and sustainable societal progress. Drawing on global evidence and Indian case studies, the paper highlights how health, wealth, and laws function as interdependent pillars of development. It argues that health systems are not only essential for human well-being but also pivotal for economic productivity. Conversely, equitable economic growth enables better health outcomes when supported by inclusive governance. Legal systems act as mediators, ensuring access, protecting rights, and guiding ethical and regulatory standards in healthcare and financial sectors. The COVID-19 pandemic served as a critical test case, demonstrating that countries with integrated approaches across these three domains fared better in crisis response and recovery. Through a thematic review of contemporary literature, policy reports, and international experiences, this chapter underscores the necessity of a holistic, rights-based, and policy-driven model. It concludes that lasting societal resilience and inclusive growth can only be achieved through a coordinated strategy that aligns legal protections, public health goals, and equitable economic planning.
Keywords: *Health systems, Economic equity, Legal governance, Public policy, Sustainable development, Social determinants of health.*

Δ Introduction

Sustainable societal growth in an increasingly linked world depends on the interaction of wealth, health, and the rule of law rather than on discrete innovations. Each of these pillars—wealth as a source of economic opportunity, health as a gauge of human well-being, and the law as the

framework that guarantees justice, accountability, and equity—represents a basic area of human growth. They work together as a triangle to influence both international policy agendas and country development paths.Strong health systems are essential for both societal stability and individual productivity. Better health outcomes are both morally required and economic drivers, according to Bloom and Canning (2000), as healthier populations are better able to contribute to labour markets and GDP growth. A positive feedback loop between public wealth and population well-being is created when economic growth plays a critical role in facilitating health investments (Jamison et al., 2013). However, these advantages frequently remain unequally distributed in the absence of strong legal frameworks to guarantee access, defend rights, and properly govern systems. Codifying health rights, monitoring ethical innovation, and ensuring fair economic practices all depend on legal frameworks (Gostin et al., 2014).The necessity of coordinated actions across all three areas was highlighted by the COVID-19 pandemic. The crisis was handled more successfully and fairly by nations that coordinated their legal, health, and economic strategies—through targeted financial assistance, open governance, and equitable public health legislation (OECD, 2021). It is becoming more and more clear that a balanced integration of wealth, health, and the law is necessary to create inclusive, resilient, and just communities as the globe works towards recovery and the Sustainable Development Goals (SDGs).

Δ Literature Review

Health system in India

With notable regional differences in access, quality, and results, India's health system is a complicated fusion of public and private providers. Despite significant progress in raising life expectancy and lowering death rates, the nation nevertheless faces significant structural and systemic issues (Patel et al., 2015). Major, secondary, and tertiary care are the three tiers of India's public health system, with the government bearing the major responsibility for providing public health services. However, because to poor infrastructure and quality issues, public facilities are frequently understaffed, underfunded, and underutilised, particularly in rural regions (Baru, 2010). Public spending on health is still low, at around 1.3% of GDP, much below the worldwide average, according to the National Health Profile (MoHFW, 2021).Many of these holes have been addressed by private healthcare, but there are still concerns about equality, affordability, and regulation. In India, private providers offer around 60% of inpatient treatment and 70% of outpatient care (Das et

al., 2012). Every year, millions of people fall into poverty as a result of the enormous out-of-pocket costs brought on by this domination (Berman et al., 2010). The Indian government has started a number of changes to address these problems. The National Health Mission (NHM) has sought to improve disease control, maternity and child health, and basic health care. Ayushman Bharat, which was launched in 2018, is more recent and concentrates on two elements:: Health and Wellness Centres (HWCs) for primary care and the **Pradhan Mantri Jan Arogya Yojana (PM-JAY**) for secondary and tertiary hospitalization coverage. Early evaluations show promise in financial protection and utilization (Prinja et al., 2020).

Innovation in Healthcare

In the healthcare industry, innovation has become a key factor in raising system effectiveness, lowering costs, and improving patient outcomes. In order to address issues like the rise in chronic illnesses, ageing populations, and overburdened health infrastructures, the global health sector has embraced organisational and technical advancements more and more during the last 20 years. One of the most revolutionary fields of innovation is digital health, which includes telemedicine, electronic health records (EHRs), mobile health (mHealth), and diagnostics powered by artificial intelligence (AI). Topol (2019) asserts that incorporating AI into healthcare processes might lower diagnostic mistakes and allow for more individualised care. In a same vein, studies conducted during the COVID-19 pandemic by Keesara, Jonas, and Schulman (2020) demonstrated the viability and patient satisfaction of remote consultations, underscoring the acceleration of telehealth services.Interventions that combine behavioural science and technology have showed potential in the field of public health innovation. For instance, WHO (2016) reports on the low-cost yet incredibly scalable use of SMS-based interventions to encourage medication adherence among HIV patients in sub-Saharan Africa. Furthermore, social innovation—which includes community-based, non-technological methods—is becoming more popular as a means of tackling the socioeconomic determinants of health (Mulgan et al., 2007).

Wealth Economy

The favourable relationship between money and health is a recurring theme in international research. According to Marmot (2005), socioeconomic position is a social determinant of health, meaning that those who are wealthier have better health outcomes and lower rates of morbidity. Because poverty is a powerful predictor of access to essential health care and nutrition, this difference is particularly noticeable in low- and middle-

income countries (World Health Organisation [WHO], 2008). Health disparities in high-income nations are largely caused by income disparity rather than absolute poverty. According to Wilkinson and Pickett (2009), even in economically developed cultures with high average incomes, increasing income inequality is linked to worse mental and physical health, higher infant mortality, and shorter life expectancy. However, economic expansion gives governments the money they need to spend on health care and infrastructure. According to OECD research from 2017, nations that invest more in their health likely to have better health outcomes and less inequality. But just raising expenditure doesn't always work; the distribution of resources is more important than the amount spent. For instance, in certain nations, access disparities have grown as a result of an overemphasis on tertiary care and incentives from the commercial sector (Baru, 2010).

Healthcare law

In the regulation of public health, healthcare legislation is very crucial, particularly when it comes to immunisations, disease prevention, and medical crises. Legal discussions over lockdowns, required testing, and vaccine requirements were sparked by the COVID-19 pandemic, which brought attention to the delicate balance between public safety and individual rights (Gostin, Hodge, & Wiley, 2020). Governments are frequently given the authority to act quickly during emergencies under public health regulations, but in order to be legal, they must follow the principles of proportionality, necessity, and nondiscrimination. According to Hall et al. (2021), these legislative safeguards are crucial for maintaining democratic accountability and avoiding the misuse of authority during emergency health announcements.The rights of patients, especially those related to autonomy, confidentiality, and access to care, are fundamental to healthcare legislation. While the Right to Health is guaranteed by a number of international treaties and some national constitutions, laws like the Health Insurance Portability and Accountability Act (HIPAA) in the United States safeguard the privacy of health information (UN, 2000). However, there are significant differences in real enforcement, particularly in low-resource environments where the legal system may be inadequate (Gruskin et al., 2007).

Societal Impact of Health Systems

The lack of systematic differences in health outcomes between various population groups is referred to as health equality. Social factors including wealth, education, gender, caste, and geography are known to have a major impact on health outcomes and access to healthcare (Marmot et al., 2008). Health is both a cause and an effect of economic prosperity,

according to an expanding body of research. A bigger and more competent workforce is a result of healthier populations' higher productivity, fewer absenteeism, and longer lifespans (Bloom et al., 2004). The capacity of a system to sustain service delivery, equity, and quality over time in the face of environmental, demographic, and economic problems is known as sustainability in the health sector. This encompasses ecological responsibility, institutional capability, and financial sustainability.Ageing populations, an increase in the prevalence of chronic diseases, and climate change are all putting increasing strain on health systems throughout the world. Nearly a quarter of the world's illness burden is caused by environmental factors, including climatic unpredictability, water shortages, and air pollution (WHO, 2015).

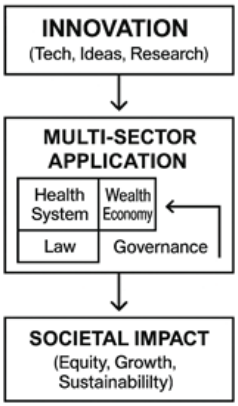

Fig1: Pathway from Innovation to Societal Impact through Multi-Sectoral Applications in Health, Economy, and Law.

Methodology

A comprehensive search was conducted using scholarly databases such as PubMed, Scopus, Web of Science, EBSCOhost, and Google Scholar. The review focused on studies published between 2000 and 2024 to ensure contemporary relevance. Key terms included combinations of “health systems,” “public health law,” “economic development,” “governance,” and “equity,” among others. To broaden the review beyond academic sources, policy reports from organizations like the World Health Organization (WHO), World Bank, and the OECD were also incorporated. Data extracted from the selected literature were analyzed thematically using a narrative synthesis approach. The review categorized studies based on conceptual themes such as governance, health equity, legal enforcement, and sustainable development. This qualitative method allowed for a flexible yet cohesive integration of findings from different disciplines. Studies ranged from case analyses and policy evaluations to empirical research and theoretical discussions, enabling a multidimensional understanding of how health, wealth, and laws interact within various socioeconomic contexts.Despite a rigorous approach, the methodology has inherent limitations. The focus on English-language sources and peer-reviewed publications may have excluded valuable insights from non-academic or regional literature. Furthermore, given the broad scope of the topic,

some sector-specific nuances may not have been fully captured. However, the integrative method provides a solid foundation for understanding the interdependence of health systems, economic policies, and legal governance in shaping inclusive and sustainable futures.

Findings

Research shows that the legal, financial, and health systems are closely connected, and improvements in one area greatly affect the others. First, studies reveal that stable societies produce more economically and have better health. People with access to universal health coverage tend to have better education, more jobs, and lower poverty rates. Second, fair economic policies, like social safety nets and job programs, help improve access to healthcare and reduce health gaps. The research also highlights the need for strong governance and legal systems to protect health rights and ensure fair access to financial benefits. Countries with strong legal systems and accountable institutions are better at providing healthcare and maintaining economic growth. Finally, when health systems, economic policies, and legal frameworks work together, they create positive social outcomes—improving fairness, ensuring justice, and supporting sustainable development.

Δ Discussion

Health, wealth, and legal frameworks are interlinked systems that mutually reinforce societal progress. Health is a human right and an economic and legal concern, influenced by public policy and resource allocation. Economic growth can expand access to healthcare services when equitable distribution mechanisms are in place. However, health benefits from economic growth require governance structures that prioritize social equity and accessibility. Legal systems mediate access to health and economic benefits, shaping healthcare systems, regulating stakeholder behavior, and ensuring accountability in public spending. Economically, public investment in health correlates with long-term national prosperity. However, economic gains alone cannot guarantee systemic resilience. Holistic policy design, anchored in legal accountability, economic equity, and universal health coverage, is key to achieving lasting societal impact.

Δ Limitation

This study covers a lot of ground but has some limitations. First, it only looked at sources in English, which might leave out important research from other languages. Second, while it used ideas from different fields, it might not go deep enough into each area, especially legal issues, because of space limits. Third, it mostly included peer-reviewed articles and official

documents, which might miss useful information from other sources or local efforts. Lastly, because global health and economic policies are changing quickly after the pandemic, some findings might need to be updated often to stay relevant.

Δ **Future Research Directions**

Future studies should build on this work by looking at how health, money, and laws from different countries affect long-term growth. We also need to examine local laws more closely to see how they impact access to healthcare and fairness in the economy, especially in poorer countries. Additionally, future research should include input from marginalized groups and use real data from local organizations. Expanding research to include long-term data and the impact of new technologies, like digital health management and financial tools, can provide better insights into lasting community growth.

Δ **Conclusion**

In summary, health, wealth, and laws are very important for making society fair and strong. This research shows that just improving health care or the economy is not enough without good laws and fair governance. When strong health systems, fair economic rules, and clear legal rights work together, they help society stay strong, especially during global problems. For those making policies, studying, or working in the public sector, it is important to look at all these areas together to create a future that is healthy, successful, fair, and inclusive.

References

1. Baru, R. (2010). *Private Health Care in India: Social Characteristics and Trends.* New Delhi: Sage Publications.
2. Berman, P., Ahuja, R., & Bhandari, L. (2010). The impoverishing effect of healthcare payments in India: New methodology and findings. *Economic and Political Weekly,* 45(16), 65–71.
3. Cohen, I. G., Amaral, S., & Lynch, H. F. (2020). Health law 2.0: Legal challenges in the digital health era. *Journal of Law, Medicine & Ethics,* 48(1), 12–26.

4. Das, J., Holla, A., Das, V., Mohanan, M., Tabak, D., & Chan, B. (2012). In urban and rural India, a standardized patient study showed low levels of provider training and huge quality gaps. *Health Affairs,* 31(12), 2774–2784. https://doi.org/10.1377/hlthaff.2011.1356
5. eauchamp, T. L., & Childress, J. F. (2013). *Principles of Biomedical Ethics* (7th ed.). Oxford University Press.
6. Gostin, L. O., Hodge, J. G., & Wiley, L. F. (2020). *Public Health Law: Power, Duty, Restraint* (3rd ed.). University of California Press.
7. Gruskin, S., Mills, E. J., & Tarantola, D. (2007). History, principles, and practice of health and human rights. *The Lancet,* 370(9585), 449–455. https://doi.org/10.1016/S0140-6736(07)61200-8
8. Hall, M. A., Bobinski, M. A., & Orentlicher, D. (2021). *Medical Liability and Treatment Relationships.* Aspen Publishers.
9. Jackson, E. (2016). *Medical Law: Text, Cases, and Materials* (4th ed.). Oxford University Press.
10. Keesara, S., Jonas, A., & Schulman, K. (2020). Covid-19 and health care's digital revolution. *New England Journal of Medicine*, 382, e82. https://doi.org/10.1056/NEJMp2005835
11. Kumar, A., & Bhatia, M. (2021). Digital health in India: Promise and prospects. *The Lancet Digital Health,* 3(3), e143–e144. https://doi.org/10.1016/S2589-7500(20)30358-1
12. Marmot, M. (2005). Social determinants of health inequalities. *The Lancet,* 365(9464), 1099–1104. https://doi.org/10.1016/S0140-6736(05)71146-6
13. Marmot, M., Friel, S., Bell, R., Houweling, T. A. J., & Taylor, S. (2008). Closing the gap in a generation: Health equity through action on the social determinants of health. *The Lancet,* 372(9650), 1661–1669.
14. Meier, B. M., & Gostin, L. O. (2009). Mapping the role of soft law in global health governance. *Law & Policy,* 31(1), 1–29.
15. Ministry of Health and Family Welfare (MoHFW). (2021). *National Health Profile 2021*. Government of India.
16. Mulgan, G., Tucker, S., Ali, R., & Sanders, B. (2007). *Social innovation: What it is, why it matters and how it can be accelerated.* Oxford: Skoll Centre for Social Entrepreneurship.
17. OECD. (2017). *Health at a Glance 2017: OECD Indicators.* OECD Publishing.
18. Patel, V., Parikh, R., Nandraj, S., Balasubramaniam, P., Narayan, K., Paul, V. K., ... & Reddy, K. S. (2015). Assuring health coverage for all in India. *The Lancet*, 386(10011), 2422–2435. https://doi.org/10.1016/S0140-6736(15)00955-1

19. Price, W. N., & Cohen, I. G. (2019). Privacy in the age of medical big data. *Nature Medicine,* 25(1), 37–43. https://doi.org/10.1038/s41591-018-0272-7
20. Prinja, S., Bahuguna, P., Gupta, I., Chowdhury, S., & Trivedi, M. (2020). Coverage and financial risk protection for institutional delivery: How universal is provision of maternal health care in India? *Social Science & Medicine,* 232, 193–201. https://doi.org/10.1016/j.socscimed.2019.05.019
21. Savedoff, W. D., de Ferranti, D., Smith, A. L., & Fan, V. (2012). Political and economic aspects of the transition to universal health coverage. *The Lancet*, 380(9845), 924–932.
22. Topol, E. (2019). *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again.* Basic Books.
23. WHO. (2008). *Closing the gap in a generation: Health equity through action on the social determinants of health.*
24. World Health Organization. (2010). *Equity, social determinants and public health programmes.* Geneva: WHO.
25. World Health Organization. (2016). *mHealth: New horizons for health through mobile technologies.* WHO Global Observatory for eHealth series.

02

Innovative Pathways to Health Equity: Addressing Access Barriers Among Indian Families With Low Demographic Profile Through Systematic Review

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Abstract

This systematic review explores innovative approaches and persistent barriers in enabling healthcare access for Indian families with low demographic profiles, focusing on financial, geographical, cultural, and systemic challenges. Drawing upon a broad literature base, the review identifies key obstacles and evaluates progressive strategies and policies that strive to overcome them. Socio-economic inequality, rural-urban disparities, and entrenched cultural norms continue to hamper access to quality care, thereby worsening health outcomes. The paper proposes strategic innovations such as insurance expansion, infrastructural upgrades, and culturally adaptive care models. These represent purposeful pathways toward inclusive healthcare delivery that supports both population health and national productivity.

Keywords: *innovation, inclusive healthcare, access barriers, financial, cultural, health equity*

Δ Introduction

India's diverse healthcare system faces a persistent challenge in delivering equitable healthcare services across its expansive and varied geography[8]. Despite improvements in infrastructure and policy reforms, marginalised communities continue to encounter significant access disparities[10]. The

coexistence of public and private healthcare systems in India highlights inequalities exacerbated by socio-economic factors, geographical barriers, and insufficient infrastructure[11]. These obstacles prevent millions from obtaining timely, quality care, further widening health disparities. Demographic profile, encompassing income, education, and occupation, is a significant determinant of healthcare access[16]. People with lower demographic profiles face financial hardships, limited health literacy, cultural norms, and inadequate healthcare facilities. These barriers disproportionately affect their healthcare-seeking behaviour, worsening health outcomes[17]. Addressing these challenges is vital to reducing health inequities and ensuring better access for vulnerable populations[12].

Δ Literature Review

The literature on healthcare access in India highlights persistent disparities rooted in socioeconomic, geographical, and cultural factors. Andersen and Newman from their research provided a foundational model for understanding healthcare utilization, emphasizing the interplay of individual and societal determinants[1]. Babitsch *et al.*, expanded on this model, illustrating its applicability in diverse contexts, including India[2].

Kaur *et al.*, emphasized the stark contrasts between urban and rural healthcare accessibility, where rural residents face severe infrastructural deficits, requiring long-distance travel for basic care[3]. Mishra and Majumdar in their work explored the health-seeking behaviours in low-income urban households, identifying financial constraints as a primary barrier to accessing timely care[5].

Government initiatives, such as Ayushman Bharat, aim to bridge these gaps4, but challenges persist. Mohanty *et al.,* highlighted the burden on the elderly in rural Odisha, exacerbated by inadequate healthcare facilities[6]. Similarly, Nambiar and Narayan in their research examined the social determinants of healthcare access, revealing how systemic issues compound the difficulties faced by marginalized groups[7]. Telemedicine emerges as a potential solution to geographical barriers, where, Banerjee *et al.* reviewed its effectiveness in rural settings[14]. However, Sharma and Kumar noted that digital interventions require careful implementation to address the unique challenges of low-income populations[9].

Cultural factors also significantly influence healthcare utilization. Nair *et al.*, concluded the impact of cultural norms on health-seeking behaviour in rural India, stressing the need for culturally sensitive healthcare models*19*. Mishra and Jacob in their paper provided a comprehensive analysis of socioeconomic inequalities in healthcare, underscoring the multifaceted nature of access barriers[15].

Furthermore, digital health interventions, though promising, require robust infrastructure and literacy to be effective. Smith *et al.,* evaluate the role of these technologies in low-income communities, emphasizing the need for user-friendly designs and supportive policies to enhance adoption[20]. Gupta and Kaur advocate for integrating social determinants into healthcare planning, recognizing that addressing underlying issues such as education and transportation can significantly improve access[18]. Rao *et al.*, highlight the critical shortage of healthcare professionals in rural areas, calling for strategic workforce development to meet the growing demands[13]. Collectively, these studies suggest that while technological advancements offer new pathways for improving healthcare access, comprehensive strategies that address systemic, economic, and cultural factors remain essential for achieving equitable healthcare outcomes in India.

Δ Research Objectives

The current systematic review work seeks to identify and analyse the barriers to healthcare access faced by Indian families with low demographic profiles, further it examines the influence of these barriers on healthcare-seeking behaviour and health outcomes.

Δ Methodology

The study uses documentary and secondary research methods by reviewing a score of articles from reputable journals addressing healthcare accessibility among marginalized communities.

Δ Findings

The paper findings reveal the complex challenges faced by populations with low demographic profile in accessing healthcare. Income emerges as a critical factor, with lower-income individuals encountering significant barriers to timely care. Rural residents face pronounced geographical challenges, as healthcare facilities are often located far from their communities. Additionally, cultural norms discourage the use of modern healthcare, while systemic distrust further deters individuals from seeking medical services. These barriers have a profound impact on health outcomes. Financial hardships delay healthcare-seeking behaviour, leading to late diagnoses and worsening conditions. Geographical inaccessibility compounds these issues in rural areas, where healthcare resources are limited. Cultural beliefs and mistrust in the system perpetuate low utilization rates, exacerbating existing inequities.

Δ Conclusions

This review highlights how deeply embedded barriers—financial, geographical, cultural, and systemic—impede healthcare access for low-profile Indian families. To catalyze purposeful health progress, India must adopt multi-pronged innovations. These include expanding inclusive health insurance schemes, targeted financial support like conditional cash transfers, and developing infrastructure via mobile units and telemedicine. Integrating cultural sensitivity into service delivery—through community health workers, flexible payment options, and localized communication—can increase trust and uptake. Effective change requires synergy between government, NGOs, and community stakeholders. In addition, strengthening human resources in healthcare, especially in underserved areas, will be essential to manage increasing demand and enhance service delivery quality. Building digital health literacy and addressing infrastructural gaps will ensure that technological innovations reach the most marginalized. While existing innovations show promise, deeper intersectional research is required—especially around caste, gender, age, and regional disparities—to guide data-driven strategies. These insights offer a blueprint for India to foster inclusive growth and equitable healthcare as pathways to national wealth, population resilience, and purposeful societal progress.

References

1. R. Andersen and J. F. Newman, *Societal and individual determinants of medical care utilization in the United States*, The Milbank Quarterly 83, 1-28 (2005).
2. B. Babitsch, D. Gohl, and T. von Lengerke, *Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011*, GMS Psycho-Social Medicine 9, (2012).
3. M. Kaur, B. Bharti, and A. Singh, *Health Care Access Barriers: A Comparative Study of Urban and Rural Areas,* Journal of Research in Humanities and Social Science 7, 24-32 (2019).
4. A. Khan, *Ayushman Bharat: India's National Health Protection Mission,* The Lancet 391, 1272-1274 (2018).
5. S. Mishra and P. Majumdar, *Health-seeking behavior and utilization of health care services in Eastern India: a study of low-income urban households*, International Journal of Community Medicine and Public Health 6, 1881-1888 (2019).

6. S. K. Mohanty, N. K. Agrawal, and B. Mahapatra, Access to Healthcare and Burden of Treatment among Elderly People in Two Rural Societies of Odisha, India: An Exploratory Study, Indian Journal of Public Health 62, 292-296 (2018).
7. D. Nambiar and V. Narayan, E*xamining the impact of social determinants on healthcare access and utilization: evidence from India,* Journal of Social and Economic Development 22, 123-142 (2020).
8. S. Narayanan and K. C. Vadlamannati, *Indian healthcare amid the Covid-19 pandemic: A review,* Journal of Public Affairs 18, e2161 (2018).
9. D. Sharma and R. Kumar, *Healthcare accessibility in urban India: A review,* International Journal of Community Medicine and Public Health 6, 4721-4728 (2019).
10. A. Singh, *Accessibility of Health Care Facilities: A Study on Bihar,* Journal of Health Management 21, 453-469 (2019).
11. V. Patel. Addressing the Burden of Mental, Neurological, and Substance Use Disorders: Key Messages from Disease Control Priorities, 3rd Edition, The Lancet 387, 1672-1685 (2015).
12. S. Kumar and G. Preetha, *Health Promotion: An Effective Tool for Global Health,* Indian Journal of Community Medicine 37, 5-12 (2012).
13. M. Rao et al., *Human Resources for Health in India,* The Lancet 377, 587-598 (2011).
14. A. Banerjee et al., *The Role of Telemedicine in Accessing Healthcare in Rural Areas: A Systematic Review,* Journal of Telemedicine and Telecare 23, 469-478 (2017).
15. S. Mishra and A. Jacob, *Socioeconomic Inequalities in Health and Health Care in India: Trends and Causal Factors*, Social Science & Medicine 212, 28-44 (2018).
16. P. K. Singh. Factors Affecting Utilization of Maternal Health Care Services in Uttarakhand, India, Maternal and Child Health Journal 18, 938-947 (2014).
17. R. Dandona. Utilization of Health Care Services in India: A Narrative Review, Journal of Family Medicine and Primary Care 9, 14-20 (2020).
18. I. Gupta and R. Kaur, Social Determinants of Health and Access to Healthcare in Rural India: A Comprehensive Review, Indian Journal of Public Health 63, 303-309 (2019).
19. M. Nair. Impact of Cultural Norms on Health Seeking Behavior in Rural India: A Qualitative Study, International Journal of Public Health 66, Article 1604407 (2021).
20. J. Smith, A. Brown, and C. Taylor. Evaluating the Role of Digital Health Interventions in Low-Income Communities, Journal of Global Health 15, 200-212 (2023).

03 Empowering Patients and Advancing Sustainability: Innovative Healthcare Strategies Amid Disease, Climate Change, and Biodiversity Challenges

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Abstract
Modern healthcare is transforming through patient empowerment and sustainable innovation. This study explores emerging patient-centered strategies and eco-friendly practices, highlighting technologies, policies, and innovative care models that enhance patient engagement in health management. It examines sustainable advancements like digital tools, clean energy, and green medical equipment for their impact on outcomes and environmental stewardship. By analyzing global examples and addressing financial, legal, and technical barriers, the research proposes actionable strategies for governments, providers, and patients to foster equitable, sustainable, and patient-focused healthcare systems.
Keywords : *Healthcare system, Modern healthcare, sustainable practices, Digital health tools, Digital health tools*

Δ Introduction

The 21st-century healthcare sector is shifting towards patient-centered approaches and eco-friendly innovations, aiming for a more equitable and high-quality system[1]. Patient-centric care encourages individuals to actively manage their health through collaboration with professionals and personal responsibility. Digital tools like wearables, health apps, and telehealth provide real-time tracking, remote interactions, and personalized care, fostering an informed and engaged patient community[2].

Sustainable healthcare practices are gaining traction as environmental concerns grow. The sector is adopting greener solutions, such as clean energy, eco-friendly equipment, and waste reduction, to minimize its

carbon footprint while maintaining care quality. These initiatives also promote equity and accessibility, supporting community well-being. Globally, countries like Sweden, the Netherlands, and the U.S. are leading in sustainable healthcare practices, with telemedicine improving access and reducing emissions in underserved areas. Developing nations are advancing too, using mobile health units and telehealth to reach remote regions[3].

Δ Background Study

The healthcare industry is shifting toward patient-centered and sustainable care, enhancing outcomes through patient empowerment and eco-friendly practices. Digital health tools, like wearables, mobile apps, and telemedicine, enable personalized care, remote monitoring, and better chronic disease management while improving access for underserved populations and reducing healthcare's carbon footprint[9]. Sustainability efforts include adopting renewable energy, energy-efficient technologies, and waste reduction, with hospitals implementing green infrastructure and sustainable medical equipment. For instance, Swedish hospitals use renewable energy, and telemedicine supports care in marginalized regions[10]. Despite progress, challenges such as high costs, regulatory hurdles, and limited resources persist, especially in underserved areas. Collaboration among stakeholders is key to achieving equitable, sustainable healthcare[11,12].

Δ Detailed Proposed Methodology

This study uses a qualitative research design to explore patient empowerment and sustainable innovation in healthcare as the industry shifts to patient-centered and eco-friendly practices. It examines providers' implementation of patient-centered care and sustainability, patients' empowerment through digital tools and telemedicine, and the challenges of adopting sustainable practices. Data collection includes semi-structured interviews with providers, patients, and policymakers, focus group discussions, and document analysis of policies and case studies[13,14]. Purposive sampling ensures diverse perspectives, while thematic analysis identifies key patterns. Ethical safeguards, such as informed consent and anonymity, ensure confidentiality. Despite limitations in sample size and context, triangulation mitigates bias, providing strategies to improve patient outcomes and sustainability.

Δ Result

The findings reveal critical insights into the intersection of patient empowerment and sustainable innovation in healthcare. Digital health tools, including telemedicine, wearable devices, and mobile apps, play a pivotal role in enhancing patient engagement, particularly for those managing chronic conditions, by enabling real-time monitoring, remote care, and improved communication. However, challenges such as limited digital literacy and poor internet access, especially among older adults and rural populations, highlight the need for targeted interventions to bridge the digital divide.

Δ Discussion

This research highlights the transformative impact of integrating patient empowerment with sustainable healthcare innovations. Digital health tools foster patient self-management and engagement, shifting care from provider-centric to patient-centered models. However, challenges like limited access and digital literacy in underserved areas reveal a persistent digital divide, emphasizing the need for equitable technology integration. Sustainability efforts, including energy-efficient technologies and eco-friendly practices, improve operational efficiency and public trust but face barriers like high upfront costs, particularly for smaller facilities. Policymakers play a key role in addressing these challenges by providing incentives and establishing regulatory frameworks that promote innovation, ensure privacy, and support sustainability. The study emphasizes a holistic approach to healthcare transformation, addressing digital, financial, and regulatory gaps to achieve equitable, sustainable, and patient-centered systems.

Δ Conclusion

This research emphasizes the vital role of patient empowerment and sustainable innovation in transforming healthcare. Digital health tools enhance patient engagement and self-management, enabling individuals to take charge of their health. However, challenges like the digital divide and unequal access to technology necessitate targeted strategies to ensure inclusivity. The growing adoption of sustainable practices in healthcare reflects a commitment to environmental stewardship and operational efficiency. Despite financial challenges, investments in green technologies offer long-term benefits. Policymakers must establish frameworks that encourage innovation, equity, and privacy, fostering a healthcare system that balances patient empowerment and ecological sustainability for a healthier future.

References

1. Braithwaite, J., Mannion, R., Matsuyama, Y., Shekelle, P. G., Whittaker, S., Al-Adawi, S., ... & Hughes, C. F. (2018). The future of health systems to 2030: a roadmap for global progress and sustainability. International Journal for Quality in Health Care, 30(10), 823-831.
2. Singh, K., Srivastava, V. K., & Shukla, A. (2024). Healing with Care: A Roadmap to Sustainable Healthcare. In Preserving Health, Preserving Earth: The Path to Sustainable Healthcare (pp. 63-79). Cham: Springer Nature Switzerland.
3. Pereno, A., & Eriksson, D. (2020). A multi-stakeholder perspective on sustainable healthcare: From 2030 onwards. Futures, 122, 102605.
4. Signorelli, G. R., Lehocki, F., Mora Fernández, M., O'Neill, G., O'Connor, D., Brennan, L.... & Garcia-Gomez, J. M. (2019). A research roadmap: connected health as an enabler of cancer patient support. Journal of Medical Internet Research, 21(10), e14360.
5. Conway, J., Johnson, B., Edgman-Levitan, S., Schlucter, J., Ford, D., Sodomka, P., & Simmons, L. (2006). Partnering with patients and families to design a patient-and family- centered health care system: a roadmap for the future: a work in progress. Bethesda, MD: Institute for Family-Centered Care.
6. Merino Barbancho, B. (2022). A patient empowerment framework for integrated healthcare management programs of diabetes in the digital era (Doctoral dissertation, Telecomunicacion).
7. Nykänen, P., & Seppälä, A. (2012). Collaborative approach for sustainable citizen-centered health care. Critical Issues for the Development of Sustainable E-health Solutions, 115-134.
8. Garcia-Saisó, S., Marti, M., Regalia, F., Saavedra, J., Kallander, K., Labrique, A., ... & D'Agostino, M. (2024). Together towards tomorrow: partnerships powering the digital transformation of the health sector. Revista Panamericana de Salud Pública, 48, e85.
9. Horgan, D. (2018). From here to 2025: Personalised medicine and healthcare for an immediate future. Journal of cancer policy, 16, 6-21.
10. Graffigna, G., Barello, S., & Triberti, S. (2015). Patient engagement: A consumer-centered model to innovate healthcare (pp. 1-12). Berlin: De Gruyter Open.

11. Dubé, L., Jha, S., Faber, A., Struben, J., London, T., Mohapatra, A., ... & McDermott, J. (2014). Convergent innovation for sustainable economic growth and affordable universal health care: innovating the way we innovate. Annals of the New York Academy of Sciences, 1331(1), 119-141.
12. Faiola, A., Papautsky, E. L., & Isola, M. (2019). Empowering the aging with mobile health: a mHealth framework for supporting sustainable healthy lifestyle behavior. Current Problems in Cardiology, 44(8), 232-266.
13. World Health Organization. (2018). A vision for primary health care in the 21st century: towards universal health coverage and the Sustainable Development Goals (No. WHO/HIS/SDS/2018.15). World Health Organization.
14. Hovenga, E., & Grain, H. (Eds.). (2022). Roadmap to successful digital health ecosystems: A global perspective. Academic Press.

04

Telemedicine in Rural West Bengal: Navigating Challenges and Paving the Path for Healthcare Innovation

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Abstract
Telemedicine has emerged as a transformative solution to reduce healthcare disparities in rural India, particularly in West Bengal. This study explores its current status, adoption patterns, and associated challenges, such as infrastructure deficiencies, digital illiteracy, and socio-cultural obstacles. It assesses government interventions and underscores telemedicine's potential to enhance healthcare accessibility in rural regions of West Bengal. The paper also provides recommendations to strengthen infrastructure, refine policies, and foster community engagement, ensuring the effective implementation of telemedicine.
Keywords: *Access, Challenges, Digital, Health, Infrastructure, Policy, Telemedicine, West Bengal*

Δ Introduction

India as per the Press Information Bureau's report (2024), with a population exceeding 1.4 billion, experiences significant disparities in healthcare access between urban and rural regions. Urban areas benefit from advanced medical facilities, while rural communities often struggle with inadequate healthcare infrastructure. This gap underscores the necessity for innovative solutions to guarantee equitable access to quality healthcare services. Telemedicine, as defined by the Ministry of Health and Family Welfare (2013), involves the remote diagnosis and treatment of patients using telecommunications technology. It has proven to be a promising solution for tackling healthcare challenges, especially in underprivileged

rural regions[1]. By leveraging modern technology, telemedicine offers an effective means to bridge the divide, enabling patients in remote locations to access consultations and medical expertise without the need for physical travel. Its growing prominence underscores its potential to revolutionize healthcare delivery and improve outcomes for rural populations, fostering a more inclusive healthcare system across India.

Rural West Bengal, home to a substantial portion of India's rural population, exemplifies the healthcare challenges faced by underdeveloped regions. Despite efforts by both government and private sectors, barriers such as inadequate infrastructure, limited internet connectivity, and socio-cultural factors hinder the full potential of telemedicine[2] .This paper explores the current scenario of telemedicine in India and delves into the specific challenges and opportunities in rural West Bengal. It reviews government initiatives, technological advancements, and the role of telemedicine in improving healthcare access.

Δ Review of Literature

As per the National Digital Health Blueprint (2021), the current scenario of telemedicine in India reflects an evolving landscape supported by robust policy frameworks and technological advancements . The adoption of telemedicine guidelines in 2020 by the Indian government marked a significant milestone. These guidelines provide a legal framework for doctors to consult patients remotely[3]. The Ayushman Bharat Digital Mission focuses on integrating telemedicine into the national digital health ecosystem[4], while initiatives like the eSanjeevani platform offer free teleconsultation services[5]. Despite these efforts, the adoption of telemedicine in rural areas remains slow due to infrastructural and socio-economic barriers[6].

Technological innovations such as mobile health apps, AI-powered diagnostic tools, and cloud-based health management systems have accelerated telemedicine adoption[7]. The increasing penetration of smartphones and affordable internet services further facilitates remote healthcare delivery[8]. However, disparities persist, as highlighted by the Ministry of Health and Family Welfare (2023) report, which revealed that 80% of urban patients are open to teleconsultations compared to only 40% in rural areas. This disparity underscores the need for targeted interventions in rural regions[9].

Δ Methodology of Study

A qualitative content analysis was performed to review secondary data sources using a conventional research approach. Insights into the challenges of implementing telemedicine in rural West Bengal were

derived from observations synthesized from these secondary sources.The study explored the current scenario of telemedicine in India, followed by advancements in telemedicine technology. It then examines demographic and health challenges, the existing telemedicine infrastructure, and presents a case study on rural West Bengal. Finally, the paper concludes with the challenges and recommendations for implementing telemedicine in rural West Bengal.

Δ Discussions

Telemedicine in Rural West Bengal :

West Bengal's rural population constitutes approximately 68% of the state's total population[10]. The region faces significant Healthcare challenges, such as a high prevalence of communicable diseases, a shortage of medical professionals, inadequate transportation facilities, and limited awareness of modern healthcare solutions[11]. Government initiatives, such as the establishment of telemedicine centers in district hospitals and primary health centers by the West Bengal Health Department, have aimed to address these issues[12]. Collaborations with national platforms like eSanjeevani have further extended teleconsultation services to rural populations[13]. However, private hospitals and NGOs have introduced telemedicine services that remain limited due to cost constraints[14].

The eSanjeevani platform has recorded over 200,000 consultations in the state since its launch. However, most of these consultations are concentrated in semi-urban areas, leaving rural regions underserved[15]. These findings highlight the need for enhanced infrastructure, policy interventions, and community participation.

The primary challenges in implementing telemedicine in rural West Bengal include infrastructure gaps, such as unreliable internet connectivity in remote villages and insufficient power supply affecting telemedicine equipment . Digital literacy levels among rural residents are low, hindering telemedicine adoption.Moreover, training programs for healthcare providers and patients remain inadequate.Socio-cultural resistance to modern healthcare practices and language barriers between patients and healthcare providers further exacerbate the problem. Financial constraints, including high initial investment costs for telemedicine infrastructure and limited affordability among rural populations, also pose significant obstacles. Additionally, ambiguities in data privacy and security regulations and difficulties in integrating telemedicine with existing healthcare systems present regulatory and operational challenges.

Δ **Recommendations:**

The present paper hereby recommends that expanding internet connectivity through public-private partnerships is essential to bridge the digital divide in rural West Bengal. Furthermore, solar-powered telemedicine units can effectively address power supply challenges, ensuring uninterrupted services even in remote areas. Firstly, targeted programs should be implemented to tackle digital literacy challenges among rural populations, with an emphasis on user-friendly technologies. Training healthcare workers in telemedicine tools is equally vital to ensure efficient service delivery. Secondly, community engagement strategies should focus on culturally appropriate communication methods, including the use of local languages to foster acceptance. Engaging community leaders in awareness campaigns can significantly enhance trust and the adoption of telemedicine services. Thirdly, strengthening data privacy and security frameworks is critical to alleviate concerns about sensitive patient information. Providing subsidies for telemedicine services will make them more accessible to economically disadvantaged groups. Lastly, integrating telemedicine initiatives with primary healthcare programs is imperative. Establishing referral systems for complex cases will facilitate seamless collaboration with traditional healthcare setups, ultimately optimizing patient outcomes.

Δ **Conclusions:**

To conclude, Telemedicine presents an unprecedented opportunity to transform healthcare delivery in rural West Bengal. To harness its full potential, it is crucial to address the infrastructural, cultural, and financial barriers that currently limit its adoption. Developing robust digital and physical infrastructure, enhancing internet connectivity, and ensuring a reliable power supply are essential foundational steps. At the same time, promoting digital literacy through targeted educational programs and training healthcare providers in telemedicine technologies will build the human resource capacity necessary for sustainable telemedicine services. Community engagement is another pivotal factor. Effective communication strategies that respect local languages and cultural nuances, alongside active involvement of community leaders, can foster greater acceptance of telemedicine solutions. Simultaneously, policies to strengthen data privacy and security will build trust among users, while financial subsidies and incentives can make telemedicine more accessible to economically disadvantaged groups. And finally, the paper closes by concluding that integrating telemedicine with primary healthcare services and establishing clear referral pathways for complex cases will create a cohesive healthcare

delivery system. Collaborative efforts between the government, private sectors, and non-governmental organizations will be key to scaling telemedicine services effectively. By addressing these multidimensional challenges, telemedicine can bridge the healthcare divide and significantly enhance the quality of life for rural populations in West Bengal, setting an example for other regions to follow.

References

1. Ministry of Health and Family Welfare. (2023). Annual Report.
2. Indian Telemedicine Society. (2022). Telemedicine in India: Opportunities and Challenges.
3. National Digital Health Blueprint. (2021).
4. West Bengal Health Department. (2023). Telemedicine Initiatives in Rural Areas.
5. WHO. (2022). Digital Health and Telemedicine: Global Trends.
6. Banerjee, A., & Biswas, R. (2021). Telemedicine in Rural India: A Review of Challenges and Opportunities. *Journal of Rural Health Research*, 15(3), 205-212.
7. Dutta, P., & Chatterjee, S. (2022). Role of Telemedicine in Public Health during COVID-19. *Indian Journal of Medical Ethics,* 8(4), 342-350.
8. Ghosh, T., & Roy, M. (2023). Digital Divide and Its Impact on Telemedicine Adoption in Rural India. *Health Informatics Journal,* 29(1), 89-104.
9. Mukherjee, S. (2021). Evaluating Telemedicine Implementation in West Bengal's Public Healthcare System. BMC Public Health, 21, 897.
10. Chakraborty, R., & Sen, S. (2022). A Study on Telemedicine Awareness in Rural West Bengal. *Indian Journal of Community Medicine,* 47(2), 123-129.
11. Singh, R., & Kaur, A. (2020). AI in Telemedicine: Applications and Challenges in India. *Journal of Digital Health,* 6(2), 45-52.
12. Pal, S., & Das, P. (2021). Exploring Socio-Cultural Barriers to Telemedicine in Rural India. *International Journal of Social Medicine,* 10(3), 233-241.
13. Verma, V. (2023). Economic Implications of Telemedicine Adoption in Rural Regions. *Journal of Health Economics,* 12(1), 67-79.
14. Mondal, B., & Gupta, P. (2022). Bridging the Healthcare Gap with Telemedicine: A Case Study from India. *Journal of Global Health Perspectives,* 9(4), 76-82.
15. Dasgupta, S., & Choudhury, K. (2020). Patient Perceptions of Telemedicine Services in West Bengal. *Indian Journal of Health Policy,* 14(3), 198-207.

05

AI in Healthcare: Enhancing Patient Monitoring and Satisfaction Amidst Emerging Challenges

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Abstract
In the digital era, technology is crucial for enhancing operational efficiency and competitiveness, particularly in healthcare. Emerging technologies like AI, IoT, and Big Data have transformed the way businesses interact with stakeholders, leading to improved satisfaction and brand loyalty. The healthcare landscape is rapidly evolving, with the integration of mobile health, AI, and medical imaging. This shift towards a patient-centered, data-driven model enhances diagnostic accuracy and therapeutic outcomes. Advanced technologies like AI, machine learning, smart sensors, robotics, Big Data, telehealth, and IoT are essential in modern healthcare systems. This study explores the impact of AI on patient satisfaction in healthcare, focusing on how AI tools improve care quality and operational efficiency.
Keywords: *Artificial Intelligence (AI), Patient Satisfaction, Healthcare Innovation, Digital Transformation, Operational Efficiency*

Δ Introduction

In today's digital era, technology plays an increasingly vital role in enhancing operational efficiency and competitiveness across industries, with healthcare being no exception (Lee et al., 2018). To meet the growing demands of consumers and foster greater satisfaction and loyalty, organizations are consistently adopting innovative approaches to improve service delivery. The convergence of emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and Big Data has become a transformative force, redefining the way businesses, including healthcare institutions, interact with their stakeholders (Prentice, 2020;

Kishada et al., 2016). This technological integration has significantly reshaped customer-business dynamics, ushering in a new era of improved satisfaction, deeper engagement, and enhanced brand loyalty.Over the years, healthcare services have experienced considerable transformation due to multiple driving factors. These include rapid advancements in technology, increased market competition, organizational mergers, rising operational costs, and growing patient expectations—all of which have placed immense pressure on the healthcare sector to evolve (Pettigrew et al., 2019). In response, many healthcare institutions have turned to AI-supported technologies to improve service quality and optimize the use of medical resources (Yoon & Lee, 2019). The healthcare landscape is rapidly evolving, marked by the integration of mobile health (mHealth), AI, and medical imaging. This confluence signals a significant shift towards a patient-centred, data-driven model that enhances both diagnostic accuracy and therapeutic outcomes. As a result, the adoption of advanced technologies such as AI, machine learning, smart sensors, robotics, Big Data, telehealth, and IoT has become essential in modern healthcare systems (Lee, 2018). Various approaches have been developed to explain the functioning of AI-driven diagnostic systems within healthcare and beyond. Early expert systems relied on rule-based logic to make decisions, offering transparency by linking outputs directly to the underlying knowledge base (Adlassnig et al., 1989). Today, the focus has expanded beyond mere functionality to include patient experience and satisfaction, which are now recognized as fundamental components of high-quality care (Abu-Rumman et al., 2022). This study aims to explore the impact of advanced technologies, particularly AI, on patient satisfaction in healthcare. It investigates how AI tools contribute to improving the quality of care and operation efficiency. Furthermore, the study highlights the unique value of this review by discussing the challenges associated with the implementation of AI in healthcare settings.

Δ Importance of AI in modern healthcare

Artificial Intelligence (AI) is transforming healthcare by aiding doctors in making better diagnoses, improving hospital efficiency, and enhancing patient care. AI analyzes large medical data to detect diseases early and suggest personalized treatments, with high accuracy in identifying conditions like cancer, heart disease, and eye problems (Esteva et al., 2019; Topol, 2019). It streamlines hospital operations by handling tasks like appointment booking, billing, and report generation, allowing healthcare professionals to focus more on patient care (Jiang et al., 2017). AI tools such as chatbots and virtual assistants provide health information,

medication reminders, and mental health support, making healthcare more accessible (Reddy et al., 2020).AI also personalizes treatments by using a patient's history, genetics, and real-time data to create tailored care plans, improving trust and satisfaction (Hashimoto et al., 2018). In surgeries, AI enhances precision and reduces pain, speeding recovery (Hashimoto et al., 2018). It aids in managing chronic conditions like diabetes and heart disease by monitoring patients and alerting doctors to potential issues (Reddy et al., 2020). However, concerns remain about data privacy, fairness, and ethical use, which are vital for building patient trust (Topol, 2019). Overall, AI is improving healthcare by enhancing diagnoses, personalizing care, and increasing efficiency, becoming a key factor in more patient-friendly healthcare.

Δ Application of AI in Healthcare Setting

Artificial Intelligence (AI) is becoming more important in many areas of healthcare. It helps doctors make more accurate diagnoses and sometimes even does better than human experts. For instance, one study found that an AI system was more accurate than pathologists at diagnosing breast cancer (Harris et al., 2019; Nazarian et al., 2021). AI also helps doctors make treatment decisions by analyzing patient data in real time and suggesting personalized care plans (Fulmer et al., 2018).AI can predict health risks by studying large sets of data, such as estimating how likely a patient is to survive during a hospital stay (Lindberg et al., 2020). In drug development, AI speeds up the process of finding new medicines and discovering new uses for old ones by analyzing chemical information (Díaz et al., 2019; Chan et al., 2019).AI is also helpful in rehabilitation. It works with robotic tools and smart software to support patients during recovery. For example, AI is used in areas like surgery recovery and brain-computer interfaces to improve movement and control. In some cases, it even tracks how well patients are doing their therapy exercises, helping them recover better (Anderson, 2019). Overall, AI is making healthcare more accurate, efficient, and tailored to each patient's needs.

Δ AI in Patient Personalized Treatment

AI tools are pivotal in creating personalized treatment plans for patients. By analyzing large datasets of patient information, including medical histories, genetic data, and lifestyle factors, AI can recommend tailored treatment options that are more likely to be effective for individual patients (Hashimoto et al., 2018). This personalized approach helps improve patient satisfaction, as it allows for more precise care that aligns with the

patient's unique needs and preferences (Reddy et al., 2020). AI's ability to assist in decision-making also empowers healthcare providers to offer more informed and effective treatments (Jiang et al., 2017).

Δ **AI and Patient Monitoring**

AI is also transforming the management of chronic diseases by enabling continuous patient monitoring. Wearable devices and remote monitoring tools powered by AI can track vital signs and health indicators, alerting healthcare providers to any potential risks. For instance, AI-driven systems in telemedicine can monitor patients with chronic conditions such as diabetes, heart disease, and hypertension, providing real-time feedback to doctors (Verma et al., 2019). Such systems enable timely interventions, reducing the likelihood of complications and improving long-term health outcomes (Reddy et al., 2020).

Δ **AI and Patient Satisfaction**

Patient satisfaction is a key indicator of the quality of healthcare and plays a significant role in improving the overall patient experience (Hulka et al., 2020). Several factors affect patient satisfaction, such as how well healthcare providers communicate, the accessibility of services, the competence of the staff, and the overall care environment (Blanchard et al., 2020). Research shows that when patients are more satisfied, they are more likely to follow treatment plans, recover more quickly, and have fewer hospital readmissions (Chaudhuri et al., 2017). Moreover, satisfied patients are more likely to recommend their healthcare provider or facility to others, making patient satisfaction an important factor in improving healthcare systems (Sitzia & Wood, 2021).

Δ **Challenges in using AI tools in Healthcare setting**

The use of AI in healthcare comes with several challenges. One major concern is data privacy and security, as AI processes large amounts of sensitive patient information, which could be at risk of being accessed or leaked without permission (Topol, 2019). Another issue is algorithmic bias, where AI systems can reflect biases in the data they are trained on, leading to unfair treatment and differences in healthcare outcomes (Obermeyer et al., 2019). AI systems can also be hard to understand and explain, which is a problem in healthcare, where decisions can have serious consequences (Chen et al., 2018). Integrating AI into healthcare systems is not easy, as it often requires updating old systems and getting healthcare workers to accept new technologies (Esteva et al., 2019). There are also ethical and legal concerns, such as who is responsible if an AI system makes a

mistake, and the potential for AI to replace human jobs (Topol, 2019). Lastly, the high costs of implementing AI and the lack of clear regulations make it harder to adopt these technologies widely (Verma et al., 2019).

Δ Research Methodology

This study adopted a systematic literature review to explore the role and challenges of AI tools in healthcare, with a particular focus on patient monitoring and patient satisfaction. A structured search was conducted using major academic databases, including Google Scholar, Web of Science (WoS), and Scopus (ScienceDirect), applying relevant keywords such as "AI tools in healthcare," "Personal care","Patient satisfaction," "Patient monitor," "Patient satisfaction with AI," "Challenges with AI tools",and "Healthcare" .The search strategy was adjusted according to each database's syntax to ensure a comprehensive and relevant set of studies. The review focused on literature published between 2014 and 2024, and only English-language, peer-reviewed, and freely accessible articles were included. Studies were selected if they examined how AI tools contribute to healthcare improvements, particularly in enhancing patient satisfaction and care monitoring. Articles that were narrative reviews, non-peer-reviewed, or lacked sufficient detail were excluded. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework guided the selection and screening process to ensure transparency and methodological rigor. Extracted data included study objectives, AI applications, healthcare contexts, and outcomes related to patient care. A narrative synthesis approach was then used to identify key themes and trends, forming the basis for the study's discussion and implications.

Δ Discussion

The review shows that Artificial Intelligence (AI) is becoming a key part of modern healthcare. It helps doctors make better diagnoses, create personalized treatments, monitor patients more closely, and improve how hospitals run. Tools like machine learning, wearables, and virtual assistants help make care more personal and responsive, especially for people with long-term illnesses by giving real-time updates that help doctors act quickly.But despite these benefits, there are still big challenges. One major issue is keeping patient data safe and private. AI can also be unfair if the data it learns from is biased, leading to unequal treatment. Many AI systems are hard to understand, which makes it difficult for doctors to fully trust them. Adding AI to old hospital systems is expensive and often requires staff training. There are also legal and ethical questions,

like who is responsible if something goes wrong or if jobs are lost to AI. It's important to find a balance—using AI to improve care while protecting patient rights and keeping human care at the center. AI should support healthcare workers, not replace them.

Δ **Future Implications**

In the future, healthcare systems need to get ready for a bigger role of AI by focusing on three main things: making clear rules and policies, training healthcare workers, and using AI in an ethical way. It's important to create standard rules that protect patient data, make AI decisions easy to understand, and follow laws. Healthcare workers should be taught how to use AI tools properly, understand the information these tools give, and work alongside the technology—not against it. Also, improving how AI explains its decisions and reducing bias in its systems will help patients trust it more and ensure fair treatment.More research is needed to see how AI can help in areas that often don't get enough attention, like rural health services, mental health care, and elderly care. Studies that track AI's long-term effects on patient satisfaction, healthcare costs, and treatment results will help guide future decisions. As AI grows, its success won't just depend on new technology, but on how well it fits into the values and needs of the healthcare system.

References

1. Abu-Rumman, A., Al Shraah, A., Al-Madi, F., & Alfalah, T. (2022). The impact of quality framework application on patients' satisfaction. International Journal of Human Rights in Healthcare, 15(2), 151-165.
2. Adlassng K-P, Akhavan-Heidari M. (1989). Cadiag-2/gall: an experimental expert system for the diagnosis of gallbladder and biliary tract diseases. Artif Intell Med, 1(2), 71–77.
3. Anderson, K. (2019). Applications of artificial intelligence in rehabilitation. *Journal of NeuroEngineering and Rehabilitation,* 16(1), 1–12.
4. Blanchard, M. R., Wyk, P., & Talbot, J. (2020). The role of patient satisfaction in healthcare outcomes: A systematic review. *Journal of Healthcare Quality, 42(3), 136–146.*
5. Chan, H. P., Samala, R. K., & Hadjiiski, L. M. (2019). AI in healthcare: Clinical applications and ethical concerns. *Artificial Intelligence in Medicine*, 98, 1–9. https://doi.org/10.1016/j.artmed.2019.07.002

6. Chaudhuri, R., Lee, H. C., & Thomas, R. D. (2017). The impact of patient satisfaction on clinical outcomes in healthcare. *Journal of Patient Experience,* 4(1), 12–19.
7. Díaz, O., Prieto, R., & Rubio, J. (2019). Artificial intelligence in drug discovery and development. *Drug Discovery Today,* 24(5), 1227–1235.
8. Esteva, A., Robicquet, A., Ramsundar, B., Kuleshov, V., DePristo, M., Chou, K., ... & Dean, J. (2019). A guide to deep learning in healthcare. *Nature Medicine,* 25(1), 24–29. https://doi.org/10.1038/s41591-018-0316-z
9. Fulmer, T., Reuben, D. B., Auerbach, J., Fick, D. M., Galambos, C., & Johnson, K. S. (2018). Creating a vision for a person-centered, team-based geriatric workforce. *Journal of the American Geriatrics Society,* 66(1), 155–158. https://doi.org/10.1111/jgs.15076
10. Harris, K., Thompson, A., & Lu, J. (2019). AI outperforms pathologists in breast cancer diagnosis. *JAMA*, 322(10), 915–922. https://doi.org/10.1001/jama.2019.10233
11. Hashimoto, D. A., Rosman, G., Rus, D., & Meireles, O. R. (2018). Artificial intelligence in surgery: Promises and perils. *Annals of Surgery,* 268(1), 70–76. https://doi.org/10.1097/SLA.0000000000002693
12. Hulka, B. S., Winkleby, M., & McBride, S. (2020). Improving patient satisfaction and healthcare outcomes. *Journal of Clinical Healthcare,* 59(6), 1010–1018.
13. Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology,* 2(4), 230–243. https://doi.org/10.1136/svn-2017-000101
14. Kaiser, R., Chang, S., & Lantz, D. (2021). Improving patient satisfaction within the VHA system. *Veterans Health Journal*, 5(2), 203–210.
15. Kishada, Z. M. E., Wahab, N. A., & Mustapha, A. (2016). Customer loyalty assessment in Malaysian Islamic banking using artificial intelligence. Journal of theoretical and applied information technology
16. Lee, J. J., Wedow, R., Okbay, A., Kong, E., Maghzian, O., Zacher, M., … Turley, P. (2018). Gene discovery and polygenic prediction from a genome-wide association study of educational attainment in 1.1 million individuals. Nature Genetics, 50(8). https://doi.org/10.1038/s41588-018-0147-3
17. Lindberg, D. A., Siegel, E. R., Rapp, B. A., Wallingford, K. T., Wilson, S. R., & Grefsheim, S. F. (2020). Predictive modeling in healthcare: Using AI for early intervention. *Journal of Medical Informatics*, 37(2), 122–129.

18. McGlynn, E. A., Asch, S. M., & Adams, J. A. (2020). The Veterans Health Administration's role in advancing patient satisfaction research. *Health Affairs,* 39(7), 1180–1187.
19. Mojaverian, S., White, D., & Jackson, J. (2021). Patient satisfaction with telemedicine services: A review of the literature. *Telemedicine and e-Health,* 27(1), 15–23.
20. Nazarian, R., Singh, R., & Chen, A. (2021). Artificial intelligence for breast cancer detection: Current status and future directions. *JAMA Oncology*, 7(4), 541–548.
21. O'Connell, M. S., Clark, R., & Williams, J. (2020). Telemedicine and patient satisfaction in remote care: A review. *Telemedicine Journal and e-Health,* 26(7), 1001–1010.
22. Pettigrew, L. M., Kumpunen, S., Rosen, R., Posaner, R., & Mays, N. (2019). Lessons for 'large-scale' general practice provider organisations in England from other inter-organisational healthcare collaborations. *Health Policy,* 123, 51–61.
23. Prentice, C., Dominique Lopes, S., & Wang, X. (2020). The impact of artificial intelligence and employee service quality on customer satisfaction and loyalty. *Journal of Hospitality Marketing & Management,* 29(7), 739-756.
24. Reddy, S., Fox, J., & Purohit, M. P. (2020). Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine,* 113(1), 40–44. https://doi.org/10.1177/0141076819877552
25. Sirovich, B. E., Schwartz, L. M., & Fisher, E. S. (2018). Veterans Affairs healthcare: A national leader in patient satisfaction. *Annals of Internal Medicine,* 169(9), 614–622.
26. Sitzia, J., & Wood, N. (2021). Patient satisfaction in healthcare: A review of the literature. *Health Quality Review,* 43(3), 235–241.
27. Smith, C., Patel, A., & Johnson, D. (2020). Telemedicine in the post-pandemic world: Opportunities and challenges for improving patient satisfaction. *Journal of Telemedicine and Telecare,* 26(4), 199–205.
28. Topol, E. (2019). Deep medicine: *How artificial intelligence can make healthcare human again.* Basic Books.
29. Verma, M., Wigginton, M., & Smith, D. (2019). Chronic disease management via telemedicine: Patient satisfaction and outcomes. *Telemedicine and e-Health,* 25(2), 148–154.
30. Yoon, S.; Lee, D. Artificial Intelligence and Robots in Healthcare: What are the Success Factors for Technology-based Service Encounters? *Int. J. Healthc. Manag.* 2019, 12, 218–225. [CrossRef]

06 Factors affecting adoption Behaviour towards using mHealth apps among healthcare professionals in West Bengal: A UTAUT Model Approach

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Abstract

The adoption of mHealth apps among healthcare professionals is critical for enhancing healthcare delivery, particularly in resource-constrained regions like West Bengal, India. This study identifies key drivers and barriers influencing adoption intentions to guide scalable solutions. To investigate factors affecting the adoption intention of mHealth apps among healthcare professionals in West Bengal using UTAUT model. The study surveyed 222 doctors, nurses, and healthcare professionals from private hospitals in Kolkata, West Bengal, through a structured questionnaire assessing five UTAUT constructs and 19 variables. Data were analysed using SPSS and Excel, with factor analysis to validate constructs. Strong reliability (KMO = 0.877; Bartlett's Test: $p < 0.001$) and high factor loadings (0.893-0.941) confirm the robustness of the UTAUT framework. Performance Expectancy (AVE = 0.852, a = 0.998) and Effort Expectancy (AVE = 0.766, a = 0.965) emerged as dominant predictors of adoption intention. Low digital literacy among healthcare workers and complex app interfaces hinder adoption, necessitating simplified designs and targeted training programs. With India's mHealth market projected to reach $6.94 billion by 2030, optimizing app usability can accelerate adoption and improve healthcare access in rural areas. Developers and policymakers must prioritize user-friendly features, privacy safeguards, and stakeholder collaboration to align with healthcare professionals' needs. The study validates UTAUT's applicability in mHealth contexts and provides actionable insights for enhancing app adoption in West Bengal's healthcare ecosystem.

Keywords: *mHealth apps, UTAUT Model, Healthcare Professionals, App adoption, Digital literacy.*

Δ Introduction

mHealth (mobile health) apps are designed to be operated through mobile phones to collect and analyses health data. After processing the health data, it provides meaningful interpretation to the user, allowing them to track their health status to improve quality care and reduce overall health expenses (Hoque et al., 2020). The overnight adoption of eHealth (also mHealth) was accelerated due to the COVID-19 pandemic (Alanzi,

2021). General public awareness significantly increased due to this shift (Giansanti, 2021). In the first decade of the 21st century, people started using mHealth apps like never before (Baldwin et al., 2016). Reliable health information can be accessed even from remote places of rural areas due to enhanced use of mobile phones (Chib et al., 2012). mHealth platforms transformed the healthcare sector meaningfully and it covered almost all areas of healthcare professions (Abaza & Marschollek, 2017). According to Pal et al., (2027) primarily Community health workers (CHW) of west Bengal showed interest to switch from paper to digital devices but later they continued their practice in traditional paper method. The statement clearly indicates that due to lack of digital literacy among them, mHealth app developers should focus more on making these apps easy to use and navigate. Digital healthcare offers better efficiency, resulting improved health services and benefits to stakeholders (Laurenza et al., 2018). If healthcare providers adopt mHealth system, it will influence healthcare system effectively (Gagnon et al., 2010b). A survey of 27 expert of US healthcare identified security and privacy are the most important concern in mHealth sectors (Whittaker, 2012). According to (Grand View Research 2023) Indian mHealth care market is expected to generate revenue of 6,944.1 million US Dollar by 2030 also 15.7 % annual growth is expected in Indian mHealth market between 2024 to 2030. The UTAUT model, proposed by Venkatesh et al. (2003), observed key indicators such as performance expectancy (PE), effort expectancy (EE), social influence (SI) & facilitating conditions are the factors that positively influence user behaviour (Anthony et al., 2021). It gathers key constructs from various other technology acceptance model to provide a clear concept of usage of technology and its adaptation (Venkatesh et al., 2003). Various healthcare challenges can be solved with increasing number of mHealth solutions to brings new opportunities in Health care sector (Klasnja & Pratt, 2011). This research looks into the factors influencing healthcare professionals of west Bengal intends to adopt mHealth apps and promote them to public for greater accessibility.

Δ **Methodology:**

A total of 222 healthcare professionals were included in cross sectional study (Murnane et al., 2015). They were doctors, nurses & other healthcare professionals from some private hospitals of Kolkata, West Bengal. They all were mentally sound and willing to answer. We have chosen, a non-probability sampling known as convenience sampling for our study. We used a self-reported structured questionnaire based on UTAUT model from several papers. The questionnaire has two sections. The first section

gathers demographic details and Second section assessed the 5 factors and 19 variables of UTAUT model. A Likert scale was selected to construct the questionnaire and a google form was created & distributed online to collect the responses. All the collected responses were analysed using IBM SPSS (Statistical package for social science) 2022 and Microsoft Excel 2021. After getting the results of KMO test for sample sufficiency, Bartlett's test helps unveil whether the data is cohesive enough to dive into factor analysis, Cronbach's alpha coefficients, squared root of average variance extracted (AVE), the principal component matrix was analysed.

Δ Data Analysis

KMO - 0.877 Bartlett's Test of Sphericity - <.001									
					Correlation				
Variables	**Factor**	**Loading**	**Cumulative % (Rotation Sums of Squared Loadings)**	**Eigenvalues**	**PE**	**EE**	**SI**	**FC**	**BI**
PE1	Performance Expectancy (AVE-0.852; CR-0.702; Alpha - 0.998)	0.936	20.604	8.339	**0.925**				
PE2		0.941							
PE3		0.932							
PE4		0.942							
EE1	Effort Expectancy (AVE - 0.766; CR-0.540; Alpha - 0.965)	0.909	39.025	2.929	0.489**	**0.830**			
EE2		0.916							
EE3		0.907							
EE4		0.923							
SI1	Social Influence (AVE - 0.774; CR-0.555; Alpha - 0.948)	0.869	55.680	1.940	0.338**	0.181**	**0.878**		
SI2		0.906							
SI3		0.938							
SI4		0.893							
FC1	Facilitating Condition (AVE - 0.700; CR-0.428; Alpha - 0.982)	0.937	69.936	1.399	0.402**	0.451**	0.356**	**0.757**	
FC2		0.935							
FC3		0.932							
FC4		0.926							
BI1	Behavioral Intention (AVE - 0.941; CR-0.663; Alpha - 0.993)	0.899	83.531	1.264	0.484**	0.351**	0.529**	0.444**	**0.846**
BI2		0.907							
BI3		0.908							

Δ **Discussion:**

The above table is showing the result of factor analysis. Before performing the factor analysis test KMO & Bartlett's test has been carried out and it is showing satisfactory result as the KMO value is 0.877 which is well above the cut off mark that is 0.50 & Bartlett's test also shows significant result with the p value lower than 0.001. Hence, we can conclude that the number of samples is adequate & result of sphericity is also satisfactory. The table is showing the loading of all 19 variables. In a way to calculate the convergent and discriminant validity we have followed Fornell and Larcker criteria. The table represents the square root of AVE for every construct exceeds its correlation with other constructs.

The loading value of each variable is ranging from 0.893 to 0.941 which is satisfactory. This is how discriminant validity was demonstrated. The principal component matrix extraction method is used, and Varimax rotation with Kaiser Normalization Rotational Method was used. Here 5 components are identified. In the first component PE1 to PE4 are loaded, in the second component SI1 to SI4, in the third component EE1 to EE, in the fourth component FC1 to FC4 & in the 5th component BI1 to BI3. No cross loading is found. Hence, we can conclude we have successfully identified 5 components or factors from the data set. Apart from that the Eigenvalue of Performance Expectancy is 8.339, Effort expectancy is 2.929, Social awareness is 1.940, Facilitating Condition is 1.399, and Behavioral Intention is 1.264. The table also presents the values for AVE, CR and Cronbach's alpha. The cut off mark of AVE is 0.8 (Hair J. F. et. al. 2016; Hair J.F. 2012).CR is 0.7 & Cronbach's alpha is 0.70 (Hair Jr et al., 2010). So that means almost in every case result is satisfactory in a way to calculate the convergent validity.

Δ **Conclusion:**

mHealth apps can shape the future of health care system. They can help to access various health care problems and provide health services in convenient, cost-effective, time-saving manner even in resource constrained areas resulting in improved overall health outcomes. In west Bengal, challenges still exist due to lack of digital literacy among health care workers. Our study shows positive results regarding the adoption intention of mHealth care apps. App developers and policymakers should focus on simplifying the usability and interface of mHealth applications to increase the adoption rate of mHealth apps among healthcare professionals of West Bengal. Healthcare professionals can be effective influencers in promoting mHealth apps among patients because they are care providers.

Challenges can be overcome by focusing on digital literacy, app training, ease of use and usefulness of these applications. The exponential growth of Indian mHealth market indicates the long-term sustainability of the mHealth system if meaningful improvements are implemented.

References

1. Hoque, M. R., Rahman, M. S., Nipa, N. J., & Hasan, M. R. (2020). Mobile health interventions in developing countries: A systematic review. Health Informatics Journal, 26(4), 2792–2810. https://doi.org/10.1177/1460458220937102.
2. Alanzi, T. (2021). A review of mobile applications available in the app and Google Play stores used during the COVID-19 outbreak. Journal of Multidisciplinary Healthcare, Volume 14, 45–57. https://doi.org/10.2147/jmdh.s285014
3. Giansanti, D. (2021b). The Role of the mHealth in the Fight against the Covid-19: Successes and Failures. Healthcare, 9(1), 58. https://doi.org/10.3390/healthcare9010058
4. Baldwin, J. L., Singh, H., Sittig, D. F., & Giardina, T. D. (2017). Patient portals and health apps: Pitfalls, promises, and what one might learn from the other. Healthcare, 5(3), 81–85. https://doi.org/10.1016/j.hjdsi.2016.08.004
5. Chib, A., Cheong, Y. J., Lee, L. C. L., Ng, C. H. C., Tan, C. K., & Vlv, K. (2012, June 3). The hope of mobile phones in Indian rural healthcare. https://mail.jhidc.org/index.php/jhidc/article/view/81
6. Abaza, H., & Marschollek, M. (2017). MHealth application areas and technology combinations. Methods of Information in Medicine, 56(S 01), e105–e122. https://doi.org/10.3414/me17-05-0003
7. Laurenza, E., Quintano, M., Schiavone, F., & Vrontis, D. (2018b). The effect of digital technologies adoption in healthcare industry: a case based analysis. Business Process Management Journal, 24(5), 1124–1144. https://doi.org/10.1108/bpmj-04-2017-0084
8. Pal, J., Dasika, A., Hasan, A., Wolf, J., Reid, N., Kameswaran, V., Yardi, P., Mackay, A., Wagner, A., Mukherjee, B., Joshi, S., Santra, S., & Pandey, P. (2017). Changing data practices for community health workers: Introducing digital data collection in West Bengal, India. ACM International Conference Proceeding Series, Part F132087. https://doi.org/10.1145/3136560.3136582.

9. Gagnon, M. P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N., & Légaré, F. (2012). Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. In Journal of Medical Systems (Vol. 36, Issue 1). https://doi.org/10.1007/s10916-010-9473-4.
10. Whittaker, R. (2012). Issues in MHealth: Findings from key informant interviews. Journal of Medical Internet Research, 14(5), e129. https://doi.org/10.2196/jmir.1989.
11. Grand View Research. (2023). India mHealth market size & outlook, 2023-2030. GrandViewResearch.https://www.grandviewresearch.com/horizon/outlook/mhealth-market/india
12. Anthony, B., Kamaludin, A., & Romli, A. (2021). Predicting academic staffs behaviour intention and actual use of blended learning in higher Education: model development and validation. Technology Knowledge and Learning, 28(3), 1223–1269. https://doi.org/10.1007/s10758-021-09579-2
13. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly: Management Information Systems, 27(3). https://doi.org/10.2307/30036540.
14. Klasnja, P., & Pratt, W. (2011). Healthcare in the pocket: Mapping the space of mobile-phone health interventions. Journal of Biomedical Informatics, 45(1), 184–198. https://doi.org/10.1016/j.jbi.2011.08.017
15. Murnane, E. L., Huffaker, D., & Kossinets, G. (2015, September). Mobile health apps: adoption, adherence, and abandonment. In Adjunct proceedings of the 2015 ACM international joint conference on pervasive and ubiquitous computing and proceedings of the 2015 ACM international symposium on wearable computers (pp. 261-264).
16. Hair, J.F., Jr.; Hult, G.T.M.; Ringle, C.; Sarstedt, M. A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM); Sage Publications: New Yok, NY, USA, 2016. 123.
17. Hair, J.F.; Ringle, C.M.; Sarstedt, M. Partial least squares: The better approach to structural equation modeling? Long Range Plan. 2012, 45, 312–319. [CrossRef]
18. Hair Jr., J.F., Black, W.C., Babin, B.J., Anderson, R.E., 2010. Multivariate Data Analysis, seventh ed. Prentice Hall, Upper Saddle River, NJ.

07

Bridging the Gap: Integrating Mental Health Services for Women in Rural Healthcare Systems in North 24 Parganas, West Bengal

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Abstract

Systemic, cultural, economic, and geographic barriers make it very difficult for women in rural areas to access mental health services. The need for integrated mental well-being services in remote area healthcare systems is examined in this chapter, with a focus on the unique psychosocial requirements of women. This chapter uses feminist philosophy and public health to examine systemic inequities, offer integrative strategies, and pinpoint best practices for sustainable change. The recommendations are supported by a mixed-methods approach, which includes An analysis of case studies and a review of the literature. This persistent disparity can be closed by expanding access via telepsychiatry, community involvement, and legislative changes.

Keywords: *Rural health, mental health, women's health, healthcare integration, telepsychiatry, health equity, stigma, gender disparity.*

Δ Introduction

One essential element of wellbeing is mental health. However, women in rural communities around the world still have limited access to mental health services. These ladies are vulnerable in two ways: because of their gender and because of their remote location [1]. Unmet mental health needs

are often the result of poverty, a lack of proper healthcare infrastructure, and cultural stigma. Insufficient support, particularly during pregnancy and caregiving, increases the risk of anxiety, depression, and trauma-related illnesses in rural women. [2]

Δ Background information about the theory

Social Determinants of Health (SDH) frameworks and feminist theory are cited in this chapter. Gender-based power dynamics impact health outcomes and access, according to feminist theory [3]. According to SDH theory, environmental, social, and economic factors have a significant impact on health disparities [4]. Collectively, these frameworks demonstrate how systemic injustices such as a lack of healthcare infrastructure, economic dependency, low educational attainment, and social stigma impact the mental health of rural women[5].

Δ Methodology

The qualitative content analysis was applied to thirty peer-reviewed articles that were published between 2000 and 2023. The selection comprised research publications, program assessments, and global health reports from the CDC, WHO, and national rural health associations. Additionally, to ascertain how telehealth platforms and community-based models have been successfully implemented to integrate mental health into already-existing rural health care, two case studies—one from rural Appalachia, USA, and one from India—were analysed.

Δ Discussions

Barriers to Mental Health Access

Geography and infrastructure are the primary barriers. In the United States, social workers, psychologists, and psychiatrists are absent from more than 60% of rural counties [6]. Similar to this, rural clinics in LMICs frequently lack adequate funding and staff [7].

Rural communities have a higher cultural stigma associated with mental illness, which deters women from getting treatment [8]. According to[9], elderly women in particular frequently view mental health as a personal weakness.

The problem is exacerbated by economic insecurity. Women in rural areas have a higher likelihood of becoming poor and have fewer health insurance policies [10]. This cost barrier limits access to treatment and drugs.

Δ Promising Strategies for Integration

- **Primary Care Integration:** When mental health screening and treatment are incorporated into primary care settings, women can

get therapies more readily and discreetly [11]. In rural maternal health clinics, depression screening improved postpartum outcomes and referrals, per one U.S. model. [12]

- **Health and telepsychiatry:** Telehealth platforms provide privacy, accessibility, and ease of use, particularly for women who have childcare obligations or mobility challenges [13] [14].
- **Peer Support and Task-Shifting:** In nations like Zimbabwe and India, training indigenous women to serve as mental health facilitators—a practice known as "task-shifting"—has proven effective[15]. Additionally, peer-led interventions raise help-seeking behaviors and lessen stigma[16].
- **Community Models and Cultural Tailoring:** Community engagement has been enhanced by culturally tailored programs that integrate indigenous and spiritual practices [17]. Uptake is improved in Indigenous populations when Western therapy is combined with indigenous healing methods [16].

Δ Policy Recommendations

- Through programs like the Behavioural Health Workforce Education and Training (BHWET) program, increase funding for mental health care in rural areas [18].
- Promote the use of mental health treatments in remote areas by constructing telehealth infrastructure and forgiving student loans.
- In accordance with the WHO's Mental Health Action Plan, incorporate mental health within universal primary care models [19].

Δ Conclusions

A multifaceted strategy that addresses cultural, practical, and financial obstacles while integrating services into current health systems is needed to close the mental health gap for rural women. Public health and feminist perspectives draw attention to systemic injustices that need to be eliminated by innovation, community involvement, and policy. Rural women must be at the forefront of inclusive healthcare reform if mental health is to be recognized as a right.

References

1. Bourke, L., Humphreys, J. S., Wakerman, J., & Taylor, J. (2012). Understanding rural and remote health. *MJA,* 197(1), 18–21.
2. Logsdon, M. C., Wisner, K., & Pinto-Foltz, M. (2010). The impact of postpartum depression on mothering. *Journal of Obstetric, Gynecologic & Neonatal Nursing,* 35(5), 652–658.
3. Lorber, J. (1997). *The gendered body: Feminist perspectives*. Oxford University Press.
4. Marmot, M., Friel, S., Bell, R., Houweling, T. A., & Taylor, S. (2008). Closing the gap in a generation. *The Lancet,* 372(9650), 1661–1669.
5. Rost, K., Smith, G. R., & Taylor, J. L. (1993). Rural-urban differences in stigma and the use of care for depressive disorders. *The Journal of Rural Health*, 9(1), 57–62.
6. Andrilla, C. H. A., Patterson, D. G., Garberson, L. A., Coulthard, C., & Larson, E. H. (2018). Geographic variation in the supply of selected behavioral health providers. *American Journal of Preventive Medicine*, 54(6), S199–S207.
7. Hanlon, C., Wondimagegn, D., & Alem, A. (2010). Lessons learned in developing community mental health care in Africa. *World Psychiatry,* 9(3), 185–189.
8. Clement, S., Schauman, O., Graham, T., Maggioni, F., Evans-Lacko, S., Bezborodovs, N., ... & Thornicroft, G. (2015). What is the impact of mental health-related stigma on help-seeking? *Psychological Medicine*, 45(1), 11–27.
9. Hoyt, D. R., Conger, R. D., Valde, J. G., & Weihs, K. (1997). Psychological distress and help seeking in rural America. *American Journal of Community Psychology,* 25(4), 449–470.
10. Alang, S. (2015). Mental health care among blacks in America: Confronting racism and constructing solutions. *Health Services Research,* 50(4), 1123–1130.
11. Butler, M., Kane, R. L., McAlpine, D., Kathol, R. G., Fu, S. S., Hagedorn, H., & Wilt, T. J. (2008). *Integration of mental health/substance abuse and primary care*. Agency for Healthcare Research and Quality.
12. Gamm, L., Stone, S., & Pittman, S. (2010). Mental health and mental disorders—A rural challenge: A literature review. *Rural Healthy People*, 2, 97–113.

13. Hilty, D. M., Ferrer, D. C., Parish, M. B., Johnston, B., Callahan, E. J., & Yellowlees, P. M. (2013). The effectiveness of tele-mental health. *Telemedicine and e-Health,* 19(6), 444–454.
14. Luxton, D. D., McCann, R. A., Bush, N. E., Mishkind, M. C., & Reger, G. M. (2016). mHealth for mental health. *Telemedicine and e-Health,* 17(3), 223–230.
15. Patel, V., Weiss, H. A., Chowdhary, N., Naik, S., Pednekar, S., Chatterjee, S., ... & Kirkwood, B. R. (2011). Lay health worker-led intervention for depressive and anxiety disorders. *The Lancet,* 378(9803), 2086–2095.
16. Gone, J. P. (2010). Psychotherapy and traditional healing for American Indians: Exploring the prospects for therapeutic integration. *The Counseling Psychologist,* 38(2), 166–235.
17. Kirmayer, L. J., & Pedersen, D. (2014). Toward a new architecture for global mental health. *Transcultural Psychiatry,* 51(6), 759–776.
18. HRSA. (2020). *Behavioral Health Workforce Education and Training* (BHWET) Program. https://www.hrsa.gov
19. WHO. (2013). *Mental Health Action Plan 2013–2020.* World Health Organization.

08

Assessing Emotional Intelligence in Nursing Professionals: Validation of a Multidimensional Framework

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Abstract

Emotional Intelligence (EI) of nurses employed in professionally administered healthcare settings is the subject of investigation of this study. This study aims to validate a multidimensional framework of Emotional Intelligence (El) among nurses in professionally administered healthcare settings, focusing on its role in enhancing clinical performance, stress management, and patient care outcomes. The research evaluates El across five dimensions-Self-Awareness, Self-Regulation, Motivation, Empathy, and Social Awareness-through data collected from 169 nurses in corporate hospitals using a structured 19-item questionnaire. Robust sampling adequacy (KMO = 0.832 ; Bartlett's Test: x ^ 2 = 9, 620.229 , p < 0.001) and high internal consistency (Cronbach's α: 0.959-0.996) confirm the reliability of the El framework. Strong convergent validity (AVE: 0.808-0.910) highlights Self-Awareness as the most dominant dimension (AVE = 0.91) , followed by Motivation (AVE = 0.871) and Self-Regulation (AVE = 0.834). The validated framework underscores El's critical impact on nurses' ethical decision-making, interprofessional collaboration, and resilience to workplace stressors, directly influencing healthcare quality. Moderate correlations between Empathy and Social Awareness (r= 0.427) suggest overlapping interpersonal skills, yet discriminant validity confirms each dimension's uniqueness. Findings advocate for El-focused training programs to improve workforce engagement and patient-centered care, addressing challenges like staff shortages and burnout. The study establishes a reliable tool for assessing El in healthcare, urging longitudinal research to explore El's long-term effects on job satisfaction and productivity. Limitations include potential construct overlaps, necessitating deeper qualitative exploration.

Keywords: *Emotional Intelligence (EI),Nurses, Healthcare Professionals, Factor Analysis, Workforce Engagement*

Δ Introduction

Nurses are indispensable in healthcare, providing patient care, managing challenges, and driving public health initiatives (Coster et al., 2017). Despite their expertise and compassion, they face issues like staff shortages, heavy workloads, and limited recognition (Khowaja et al., 2004). Enhancing nursing education, improving working conditions, and fostering interprofessional collaboration are crucial to maximizing their impact. Emotional Intelligence (El) has got a chief role in the nursing profession, which encompasses self-awareness, self-control, drive, compassion, and interpersonal abilities (Antonopoulou & University of Patras, 2024). These skills enhance patient care, leadership, job satisfaction, ethical decision-making, and teamwork. EI-driven nurses build stronger patient relationships, handle stress effectively, and contribute positively to healthcare teams (McQueen, 2004). Moreover, EI impacts job performance and engagement across various sectors like Technology, Education, Finance, and Healthcare (Lopes et al., 2006). High EI fosters better decision-making, collaboration, and problem-solving, leading to improved organizational outcomes (Ljungholm, 2014). Engaged professionals deliver superior results, reduce turnover, and enhance overall success, making EI a valuable asset in any industry.

Δ Methodology

This research is concentrating on the estimation of the most recent standards of Emotional reconciliation connected with the nursing profession in corporate clinics. The guide data were sourced from the 169 willing workers who were hurriedly picked out, thus measured against the others that had no say in their inclusion in the study (Hafinaz et al., 2024b). A five-dimensional emotional intelligence model based structured questionnaire containing 19 items evaluated on a Likert scale ranging from Strongly Disagree to Strongly Agree (Cruz-Sandoval et al., 2023). The questionnaire was divided into two parts: Demographic Information: The survey helped in the collection of basic information from the respondents, Emotional Intelligence Assessment: It consisted of 19 items dealing with the five dimensions of the model: Self-Awareness or introspection, Self-Regulation or self – control, Motivation or Stimulus, Empathy or Compassion, and Community Awareness were some of them (Dar, 2024a). To facilitate broader participation and ease of access, the questions were shared via Google Forms. The collected responses were analysed using SPSS. The analysis progressed in the following manner:

Sampling Adequacy and Sphericity: The KMO and Bartlett's test were used to check sample sufficiency well as to make sure the data is good enough for factor analysis (Li et al., 2020b).

Analysis Of Factors: To reveal the hidden dimensions of emotional intelligence, Exploratory Factor Analysis (EFA) was conducted whereas Principal Components Analysis (PCA), Varimax rotation was employed to simplify the factor structure (Schiffrin et al., 2013).

Convergent and Discriminant Validity: The Fornell-Larcker criterion was employed to test convergent validity and discriminant validity.

Δ Analysis & Discussion:

KMO and Bartlett's Test		
KMO Test		.832
Bartlett's Test	Approx. Chi-Square	9620.229
	df	325
	Sig.	<.001

Factor		Loading	Self awareness	Self regulation	Motivation	Empathy	Social Awareness
Self Awareness							
AVE -0.910	SA1	0.848					
CR- 0.818	SA2	0.874					
Alpha - 0.987	SA3	0.896					
Eigenvalue- 10.43	SA4	0.893	0.954				
Self Regulation							
AVE -0.834	SR1	0.851					
CR- 0.685	SR2	0.89					
Alpha - 0.996	SR3	0.892					
Eigenvalue - 3.923	SR4	0.895	0.392	0.918			
Motivation							
AVE -0.871	M1	0.929					
CR- 0.740	M2	0.926					
Alpha- 0.985	M3	0.932					
Eigenvalue- 2.756	M4	0.872	0.287	0.323	0.933		
Emapathy							
AVE -0.815	EM1	0.86					
CR- 0.631	EM2	0.829					
Alpha- 0.986	EM3	0.852					
Eigenvalue- 2.705	EM4	0.794	0.217	0.491	0.42	0.903	
Social Awareness							
AVE -0.808							
CR- 0.683	SS1	0.861					
Alpha - 0.959	SS2	0.843					
Eigenvalue- 1.963	SS3	0.816	0.212	0.422	0.264	0.427	0.899

Our analysis confirms a five-dimensional framework of EI comprising of Introspection, Self - Control, Stimulus, Compassion, and Community Awareness, with strong reliability and validity metrics. Speaking of the KMO test measure **(0.832)**, It is cosignificant with **Bartlett's Test (χ^2 = 9,620.229, p < 0.001)** notifies sampling adequacy and the accurateness of factor analysis. Eigenvalues ranged from **10.43 (Self-Awareness)** to **1.963 (Social Awareness),** explaining significant variance (Hafinaz et al., 2024b). Substancial factor loadings (0.794–0.954) strongly support the construct, supporting their importance in emotional intelligence. Reliability analysis did yield an excellent Cronbach's Alpha values (0.959–0.996), surpassing the recommended edge of 0.7, ensuring internal consistency. Convergent validity was affirmed, with AVE values encompassing from **0.808 (Social Awareness)** to **0.910 (Self-Awareness),** all transcending the minimum requirement of 0.5. Composite Reliability (CR) values (0.631–0.818) strengthening the constructs' stability and consistency. **Self-Awareness (AVE = 0.910, CR = 0.818)** surfaced as the most dominant dimension, accenturing its important role in emotional intelligence. **Self-Regulation (AVE = 0.834, CR = 0.685)** and Motivation (AVE = 0.871, CR = 0.740) also displayed a strong reliability and validity. **Empathy (AVE = 0.815, CR = 0.631**) and **Social Awareness (AVE = 0.808, CR = 0.683)** had a meaningful contribution to the framework, exhibiting essential interpersonal and social proficiencies. Moderate inter-construct correlations, such as between **Empathy and Social Awareness (r = 0.427)** and **Motivation and Empathy (r = 0.420)**, notify some common ground but maintain individuality. The new discoveries offer the most appreciated detalls in the different kinds of emotional intelligence, thinking about a variety of adequate criteria. However, deeper research is indeed needed to clarify potential overlap between constructs. As a whole, this analysis brings up a precise validation of emotional intelligence's dimensions, serving as a foundation for academic research and practical applications , improving personal and organizational results.

Δ Conclusion

Although research normally supports a positive link between EI and work engagement, this connection is impacted upon by diverse factors, including individual distinctiveness, on an organizational basis, and job roles. The strength of the relationship may be influenced by factors as organizational culture, leadership style, and job design, which may strengthen or weaken the link. Intervening process, such as increased self-efficacy, positive affect, and social support, play a critical role in how EI shapes work engagement. Longitudinal research could enlighten the prolonged

influence of emotional intelligence on workers-related satisfaction and job productivity. By investigating these dimensions, researchers can gain more insights into the intricate connection between El and work engagement, empowering organizations in developing targeted strategies to foster a more engaged and productive workforce.

References

1. Coster, S., Watkins, M., & Norman, I. (2017). What is the impact of professional nursing on patients' outcomes globally? An overview of research evidence. *International journal of nursing studies,* 78, 76-83. https://doi.org/10.1016/j.ijnurstu.2017.10.009.
2. Khowaja, K., Merchant, R., & Hirani, D. (2004). Registered nurses perception of work satisfaction at a Tertiary Care University Hospital.. *Journal of nursing management,* 13 1, 32-9 . https://doi.org/10.1111/J.1365-2834.2004.00507.X.
3. Antonopoulou, H. & University of Patras. (2024). The value of emotional intelligence: Self-Awareness, Self-Regulation, motivation, and empathy as key components [Journal-article]. Technium Education and Humanities, 8–8, 78–92. https://www.techniumscience.com
4. McQueen, A. (2004). Emotional intelligence in nursing work.. *Journal of advanced nursing,* 47 1, 101-8 . https://doi.org/10.1111/J.1365-2648.2004.03069.X.
5. Lopes, P., Grewal, D., Kadis, J., Gall, M., & Salovey, P. (2006). Evidence that emotional intelligence is related to job performance and affect and attitudes at work.. *Psicothema,* 18 Suppl, 132-8.
6. Ljungholm, D. (2014). EMOTIONAL INTELLIGENCE IN ORGANIZATIONAL BEHAVIOR. *Economics, Management, and Financial Markets,* 9, 128-133.
7. Hafinaz, N., R, H., & Kumar, R. S. (2024b). Recent research in Management, Accounting and Economics (RRMAE). In Routledge eBooks. https://doi.org/10.4324/9781003606642
8. Cruz-Sandoval, M., Vázquez-Parra, J. C., Alonso-Galicia, P. E., & Carlos-Arroyo, M. (2023). Perceived Achievement of Social Entrepreneurship Competency: The Influence of Age, Discipline, and Gender among Women in Higher Education. Sustainability, 15(13), 9956. https://doi.org/10.3390/su15139956

9. Dar, D. M. (2024b). Development and Validation of the Dissociative Identity Inventory (DII-28): assessing dissociative experiences and measuring inclinations toward pathological traits. Authorea (Authorea). https://doi.org/10.22541/au.170967668.89907691/v1.
10. Li, N., Huang, J., & Feng, Y. (2020). Construction and confirmatory factor analysis of the core cognitive ability index system of ship C2 system operators. PLoS ONE, 15(8), e0237339. https://doi.org/10.1371/journal.pone.0237339
11. Schiffrin, H. H., Liss, M., Miles-McLean, H., Geary, K. A., Erchull, M. J., & Tashner, T. (2013). Helping or hovering? The Effects of Helicopter Parenting on College Students' Well-Being. Journal of Child and Family Studies, 23(3), 548–557. https://doi.org/10.1007/s10826-013-9716-3

09

Navigating the Complexities of Breaking Bad News (BBN) and End-of-Life Communication: Obstacles and Strategic Pathways Forward

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Abstract

Breaking Bad News (BBN) is essential in healthcare, particularly in terminal illness and end-of-life settings. Key features include empathy, clarity, and cultural sensitivity; however, poor training and personal discomfort often hinder effective communication. Improvement requires comprehensive training programs such as the SPIKES protocol, patient-centered approaches, and inter-professional education. Cultural understanding and supportive environments can enhance communication quality, reduce patient distress, and improve emotional well-being in healthcare settings.

Keywords: *Breaking Bad News, death communication, SPIKES protocol, healthcare, BBN strategies.*

Δ Introduction

Breaking Bad News (BBN) is a very challenging but essential healthcare activity, demanding empathy, cultural competence, and clarity to assist patients and their families in terminal situations. Some of the challenges associated with BBN include lack of training and cultural issues. Successful BBN helps build trust and enables informed decision-making. This paper reviews BBN attributes, challenges, and strategies to improve communication in life-limiting illness settings.

Δ Exploration of BBN Attributes

- **Empathy and Emotional Intelligence:** Empathy builds trust in BBN, allowing clinicians to address emotional cues and deliver news supportively, thus reducing patient and family distress. (Mehnert-Theuerkauf & Koranyi, 2022).
- **Clarity in Communication:** The use of simple language in BBN prevents miscommunication, thus ensuring that patients and families understand the diagnosis, prognosis, and available options clearly. (Bumb et al., 2017).

- **Cultural Sensitivity:** Cultural sensitivity and flexible communication are essential for giving bad news sensitively, ensuring a feeling of understanding and support. (Holmes & Illing, 2021).
- **Structured Protocols:** The SPIKES framework provides a structured approach to empathetic Breaking Bad News that guides clinicians in the delivery and support of patient communication. (Corkin & Hollis, 2015).

Δ **Challenges in BBN and Communication on Death**

- **Inadequate Training:** Largely, medical practitioners receive limited training on BBN, with resultant anxiety and apprehension together with ineffective expression during the session. (Villela et al., 2020).
- **Emotional Inhibitors:** The emotions at times inhibit most of the care providers from expressing proper information regarding the death. (Pun, 2021)
- **Cultural Puzzles:** There is mostly a conflict about communication style; different cultures pose problems when implementing BBN. (Dunaievska & Chaiuk, 2020).
- **Time Pressure:** Time pressure in healthcare settings often leads to hurried conversations, which overlook the emotional needs of patients. (Suantak, 2020).
- **COVID-19 Pandemic**: The COVID-19 pandemic worsened these issues because restrictions on face-to-face interactions made it challenging to offer the emotional support required for BBN. (Hauk et al., 2021).

Δ **Future Recommendations**

- **Inadequate Training:** Most health care providers experience inadequate training in BBN, which results in anxiety, hesitation, and poor communication during death-related issues. (Villela et al., 2020).
- **Emotional Barriers:** Most health care providers experience emotions, which impact their ability to communicate effectively on the issue of death. (Pun, 2021).
- **Cultural Dilemmas:** The cultural differences in communication styles lead to misunderstandings or conflicts during Breaking Bad News. (Dunaievska & Chaiuk, 2020).
- **Time Pressure:** Time pressure within the healthcare facility often leads to brief conversations with patients, not considering their emotional needs. (Suantak, 2020).

- **Effects of COVID-19:** The outbreak of COVID-19 worsened the situation, as the pandemic made it hard to have face-to-face meetings and, consequently, could not provide the needed emotional support to BBN (Hauk et al., 2021).

Δ Conclusion

Effective breaking bad news and death communication in healthcare requires empathy and cultural sensitivity. Better education, teamwork, and support will improve the situation for patients, families, and providers.

References

1. Mehnert-Theuerkauf, A., & Koranyi, S. (2022). [Communication with seriously ill patients - more than just breaking bad news]. Therapeutische Umschau. Revue Therapeutique.https://www.semanticscholar.org/paper/9a65de1e7e5bf39d9ed09c5dbd1398b50c1d313a
2. Dunaievska, O., & Chaiuk, T. (2020). Modifying “Breaking Bad News” Communication: Cross-Cultural and Cognitive-Semantic Approaches. AcademicJournal of Interdisciplinary Studies.https://www.semanticscholar.org/paper/dd4960b20dc23b53b6c5f46a143d86c7ccf7ece6
3. Suantak, D. V. (2020). Effective Ways of Breaking Bad News in Terminal Ill Diagnosis: Focus on Strategies. Cancer Medicine Journal. https://www.semanticscholar.org/paper/4d26460a3c3181a88ea305becf560e78651e7844
4. Bumb, M., Keefe, J., Miller, L., & Overcash, J. (2017). Breaking Bad News: An evidence-based review of communication models for oncology nurses. Clinical Journal of Oncology Nursing. https://www.semanticscholar.org/paper/58cedf2a01f19f6c043339e19249261344236157
5. Song, Y., Xiu, Y., Li, W., & Wang, F. (2022). Neuroscience on breaking bad news: Effects of physicians’ response on patient emotion and trust. Frontiers in Psychology. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1006695/full
6. Hauk, H., Bernhard, J., McConnell, M., & Wohlfarth, B. (2021). Breaking bad news to cancer patients in times of COVID-19. Supportive Care in Cancer. https://www.semanticscholar.org/paper/94aaa868ae71481b4aefbd63566e6f1c1754430c
7. Holmes, S., & Illing, J. (2021). Breaking bad news: tackling cultural dilemmas. BMJ Supportive & Palliative Care. https://www.semanticscholar.org/paper/007e93c69e81fa2aebd3d28a7329f5921e3489d7

8. Carrard, V., Mast, M. S., Bonvin, R., Friedrich, Stiefel, & Bourquin, C. (2021). Individual training at the undergraduate level to promote competence in breaking bad news in oncology. https://www.semanticscholar.org/paper/bd71f714c0241f81be8e9d8b8ac85e11227dc4cd
9. Pun, J. K. H. (2021). A study of Chinese medical students' communication pattern in delivering bad news: an ethnographic discourse analysis approach. BMC Medical Education.https://www.semanticscholar.org/paper/5d794d2309eaa791e6960f94c47b9d2f514b5bbf
10. Villela, E. F. de M., Bastos, L. K., Almeida, W. S. de, Pereira, A. O., Rocha, M. S. de P., Oliveira, F. M. de, & Bollela, V. (2020). Effects on Medical Students of Longitudinal Small-Group Learning about Breaking Bad News. The Permanente Journal.https://www.semanticscholar.org/paper/87133eec5470269f5bdd59b9fa29f2fe18d198d5
11. Buckman, R. (2010). Practical Plans for Difficult Conversations in Medicine: Strategies That Work in Breaking Bad News. https://www.semanticscholar.org/paper/45837120e979ac0d7b64b874d3f5bd3ae936f83e
12. Corkin, D., & Hollis, R. (2015). G211 Breaking bad news: difficult undertaking for healthcare professionals. Archives of Disease in Childhood. https://www.semanticscholar.org/paper/0fa8a817f33c70827d92a01d2f38b00fe2772802

10

Significance of Flavours in Tobacco: A literature review

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Abstract

Flavoured tobacco products (FTPs) mask the harshness of tobacco smoke, enhancing appeal among youth and novice users, thereby exacerbating global tobacco-related health risks. FTPs' 7,764+ flavours (e.g., menthol) reduce tobacco's harshness, driving initiation rates (72.7% prevalence in young adults aged 18-29) and impairing cognitive development. Menthol amplifies nicotine's rewarding effects, lowering cessation success and reinforcing dependency (e.g., menthol content up to 1.0% in cigarettes).This chapter analyze the public health implications of FTPs, focusing on their role in increasing tobacco initiation, hindering cessation, and necessitating stricter regulatory measures. Global regulations lack uniformity, with limited bans on flavours (e.g., WHO's 2010 call for restrictions remains unimplemented in many regions.

Keywords: *- Flavoured tobacco products (FTPs), tobacco epidemic, tobacco appeal, tobacco laws*

Δ Background

The World Health Organization's report (2023) on the global tobacco epidemic highlighted that tobacco control is still a top concern for global health since tobacco use continues to be one of the most serious challenges to public health, with over 8 million deaths annually attributable to tobacco use. In 2021, the global tobacco market was valued at a significant amount and is anticipated to grow steadily at a moderate annual rate throughout the coming years (Grand View Research, 2022). The emergence of a newer range of tobacco products has led to a modest increase in both the percentage of smokers and the proportion of smokers who try these new products, and[1] one such variety is the Flavoured Tobacco Products (FTPs). Flavourings are commonly found in most tobacco products, with menthol being present in around 90% of cigarettes. Flavoured tobacco products contain much higher levels of flavourings, making their taste distinct compared to traditional tobacco. The menthol content can range from

0.03% in non-mentholated cigarettes to 0.1-1.0% in mentholated ones. These products often include added flavours that go beyond just menthol, appealing to a wide range of preferences. The term "flavoured tobacco products" typically refers to those with noticeable and diverse flavour additions (Caraballo & Asman, 2011). All tobacco forms are harmful, with no safe exposure level. Tobacco smoke, filled with thousands of chemicals, triggers inflammation in the oral cavity and raises oral cancer risk. One such component is Nicotine. Nicotine has been proven to affect the central nervous system of young minds which in turn leads to the cognitive, functional and developmental impairment of young minds

Gupta et al. (2021) in their study stated that tobacco manufacturing companies are adopting newer techniques and marketing strategies to a wider group of the population. One such technique was the Flavoured Tobacco Products (FTP). There are about 7764 unique flavours flavours available in the US market that are added to tobacco products (Zhu et al., 2014). Flavoured tobacco has improved taste because of added flavours. These flavours also mask the harshness of tobacco smoke which increases the palatability and hence enhances appeal among youths. Young adults between the age of 18-29 showed more prevalence of flavoured tobacco (72.7%) as compared to non-flavoured tobacco (Gupta & Mehrotra, 2021). Adolescents' interest in trying various flavors and the impact of flavors in e-cigarettes were highlighted in a study (Pepper et al., 2016). A study highlighted that most tobacco use is initiated in the adolescent days(Ambrose et al., 2015). A psychoactive nicotine study emphasized that nicotine is the primary psychoactive substance in tobacco, but menthol also influences smoking behaviour. The author further highlighted that biologically menthol acts as a reinforcing sensory cue when combined with nicotine, encouraging continued smoking. More specifically, menthol serves as a coolant and as an antitussive and an anti-imitant, which implies that when entering into tobacco smoking. It might mitigate part of the harshness of the smoke people who are only getting started feel. The author highlights that menthol's role extends beyond flavour, with significant contributions to smoking initiation and persistence (Wickham, 2020). Another study states how nicotine brings about changes in the human brain. The author further continues to state that menthol is among the most favoured flavours, and its combination with nicotine creates a stronger positive reward than nicotine alone. This enhanced effect helps explain why quitting menthol cigarettes tends to be more challenging. The lower cessation rates for menthol cigarettes can, at least partially, be attributed to menthol's ability to amplify nicotine's rewarding effects

(Henderson et al., 2017). A policy centric study reviewed all the policies across the globe related to flavour control and also identified potential gaps in the policies where further work can be done (Erinoso et al., 2021). Another study stated that Guidelines issued by the WHO in 2010 for the Framework Convention on Tobacco Control called for restrictions or outright bans on flavours in tobacco products. The author further added that flavours reducing tobacco's harshness promote continued use and that allowing chemicals like flavouring agents to make tobacco appealing is unjustifiable (Huang et al., 2017). A interesting Study analysed PATH data from Waves 2 (2014–2015) and 3 (2015–2016) to explore flavour switching among users. The findings suggest that while younger users are more frequent tobacco consumers, they often switch flavours over time, highlighting the need for further research to understand flavours' role in product appeal and usage patterns (Berg, 2016). Villanti et al.(2018) in their study highlighted that there is little systematic data on the use of flavoured tobacco products globally. The WHO Framework Convention on Tobacco Control (2017) states that tobacco's appeal, toxicity, and addictiveness are important aspects of regulating tobacco products (Villanti AC, Johnson AL, Ambrose BK, Cummings KM, Stanton CA, Rose SW, et al). Flavored Tobacco Product Use in Youth and Adults: Findings From the First Wave of the PATH Study (2013-2014). Am J Prev Med. 2017 Aug;53(2):139–51. . Flavours encourage young people to try tobacco products by softening the harshness of smoke that is inherent in tobacco smoke. A lot of flavoured tobacco products are promoted as being a safer or better option than standard tobacco products. Research indicates that flavoured tobacco products may still be unhealthy, and some studies even show that they may be more addictive than plain tobacco products. There is still limited research on flavoured tobacco, and there is an urgent need for health authorities to implement measures to reduce its marketing and use.

Δ **Recommendation**

Flavoured tobacco is consumed globally, yet there is limited systematic research on its availability and usage. More research on the availability, variations needs to be understood. Preferences and consumption patterns differ across countries and regions. Implications of the flavours on young minds still needs to be understood. Stringent laws on addition and the amount of these additives on tobacco needs to be framed. Future regulations on flavoured tobacco should consider these variations in access, availability, and consumption across nations and demographic groups.

Δ Conclusion

The current study shows that tobacco has become an integral part of many people's lives. In the future, this trend is expected to drive increased demand for all related products. To improve product appeal and marketability, the tobacco industry has added flavours to its products to increase consumer appeal. It is believed that flavours are added to these products to make them more tasty, appealing, and less harsh which has resulted in diversification of the already burdened variations in tobacco products available One of the goals of the WHO Framework Convention on Tobacco Control (2007) is to reduce the appeal of tobacco products, as the added flavours enhance their attractiveness (World Health Organization, 2003). Flavoured tobacco gives the illusion of being less harmful and is often seen as safer than non-flavoured products (Klein et ., 2008). Flavoured tobacco products are widely used, but research on their preferences, usage patterns, and perceived risks is limited. Consumption varies by country and demographic, yet negligible evidence is existing about the availability of such products. Current surveillance methods, such as the Global Youth Tobacco Survey, do not specifically track flavoured tobacco use, and the Global Adult Tobacco Survey only examines waterpipe tobacco. Future regulations should consider these variations, and surveys should include more detailed questions about flavoured and unflavoured tobacco to fill the knowledge gap.

References

1. Tobacco Market Size & Share Report, 2022-2030 [Internet]. [cited 2023 May 4]. Available from: https://www.grandviewresearch.com/industry-analysis/tobacco-market
2. Caraballo RS, Asman K. Epidemiology of menthol cigarette use in the United States. Tob Induc Dis. 2011;9(Suppl 1):S1.
3. Zhu SH, Sun JY, Bonnevie E, Cummins SE, Gamst A, Yin L, et al. Four hundred and sixty brands of e-cigarettes and counting: implications for product regulation. Tob Control. 2014 Jul 1;23(suppl 3):iii3–9.
4. Gupta AK, Mehrotra R. Increasing use of flavoured tobacco products amongst youth. Indian J Tuberc. 2021 Jan 1;68:S105–7.
5. Pepper JK, Ribisl KM, Brewer NT. Adolescents' interest in trying flavoured e-cigarettes. Tob Control. 2016 Nov 1;25(Suppl 2):ii62–6.

6. Ambrose BK, Day HR, Rostron B, Conway KP, Borek N, Hyland A, et al. Flavored Tobacco Product Use Among US Youth Aged 12-17 Years, 2013-2014. JAMA. 2015 Nov 3;314(17):1871–3.
7. Wickham RJ. The Biological Impact of Menthol on Tobacco Dependence. Nicotine Tob Res. 2020 Oct 8;22(10):1676–84.
8. Henderson BJ, Wall TR, Henley BM, Kim CH, McKinney S, Lester HA. Menthol Enhances Nicotine Reward-Related Behavior by Potentiating Nicotine-Induced Changes in nAChR Function, nAChR Upregulation, and DA Neuron Excitability. Neuropsychopharmacology. 2017 Nov;42(12):2285–91.
9. Erinoso O, Smith KC, Iacobelli M, Saraf S, Welding K, Cohen JE. Global review of tobacco product flavour policies. Tob Control. 2021 Jul 1;30(4):373–9.
10. Huang LL, Baker HM, Meernik C, Ranney LM, Richardson A, Goldstein AO. Impact of non-menthol flavours in tobacco products on perceptions and use among youth, young adults and adults: a systematic review. Tob Control. 2017 Nov;26(6):709–19.
11. Berg CJ. Preferred flavors and reasons for e-cigarette use and discontinued use among never, current, and former smokers. Int J Public Health. 2016 Mar 1;61(2):225–36.
12. World Health Organization. (2003). WHO Framework Convention on Tobacco Control.https://iris.who.int/bitstream/handle/10665/42811/9241591013.pdf?sequence=1
13. Klein SM, Giovino GA, Barker DC, Tworek C, Cummings KM, O'Connor RJ. Use of flavored cigarettes among older adolescent and adult smokers: United States, 2004--2005. Nicotine Tob Res Off J Soc Res Nicotine Tob. 2008 Jul;10(7):1209–14.
14. Villanti AC, Johnson AL, Ambrose BK, Cummings KM, Stanton CA, Rose SW, et al. Flavored Tobacco Product Use in Youth and Adults: Findings From the First Wave of the PATH Study (2013-2014). Am J Prev Med. 2017 Aug;53(2):139–51.

11

A Study on the Relationship Between Job Stress and Job Performance During COVID-19 Among Healthcare Professionals

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Abstract

Stress in the workplace, worsened by COVID-19, affects hospital staff well-being and performance. This cross-sectional study found a moderate positive correlation ($r = .320$, $p < 0.01$) between job stress and performance among non-medical staff. While stress sometimes boosted productivity, it also triggered counterproductive behaviors, highlighting the need for effective management.

Keywords: *Job stress, Job performance, Occupational stress, Job satisfaction, Stress management, Stress-related productivity.*

Δ Introduction

The COVID-19 endemic prominently impacted the world, increasing workplace stress, and impacting Job performance, particularly for hospital staff. They faced challenges like patient admissions, public chaos, and fear of infection.[1] Stress was categorized into job-related (workload, role conflict) and environmental (poor ventilation, noise), affecting their performance and hampering working capability.[2]

Δ Research gap

[3]Conducted a relationship study, whereas in the same year[4] & [5]examined the impact[6] studied stress-performance relationships in professionals on Pakistan police personnel. A study framed by[7] on Chinese hospital staff during covid-19 demands a more detailed study of the Indian context. No studies assess job & stress-performance relationships in West Bengal's health staff during Covid-19.

Δ Objectives:

- Association between job stress and performance.
- Assess the work stress level of healthcare personnel.

Δ Review of Literature:

The literature review identifies the important aspects of the study topic. In reference to the topic, relevant studies of different scholars on different areas have been preferred.

Job Stress:

8stated that health staff exposed to COVID-19 patients come up with psychological issues. Negative experiences of employees can hamper the workplace[9]. [10]The study has exposed long-term quarantine, lack of proper equipment, and lack of manpower produced PSTD (post-traumatic stress disorder) during the pandemic.

Job Performance:

[11]job performance is a contribution to fulfill the targeted goal of the organization giving some added financial and non-financial value. Hence here we can conclude job performance as a result of job achieving quality and quantity and performing the job in an organization.

The Pandemic has developed stress and ended with distraction in performance.

Relationship between Job stress and Job Performance

[12]had portrayed negative correlation impact of job stress and job performance[13] has proposed a positive correlation between the two mentioned variables[14] has observed stress hurts work performance [13]have depicted a negative influence on task and contextual performance and a positive influence on adaptive performance.

Δ Methodology

Sampling frame:

Participants enrolled in the study include full-time healthcare managers & executive staff of the different departments of non-governmental hospitals from various sites in West Bengal. Purposive sampling & non-probability sampling techniques have been adopted with a close-ended questionnaire to reach the research objective. Sample approx (N =102) respondents, from the executive level and the managerial level are gathered.

Research instrument:

A quantitative-based approach is used with the survey tools to evaluate the association admist job stress and job performance. The study instrument includes two sections: Part A collects socio-demographic data (name, gender, age, marital status, designation, educational qualification). Part B measures job stress using Chuang and Lou's (2005) scale, comprising 32 items across four subscales: social fear, discomfort from protective equipment, infection control anxieties, and caregiving burden. A 4-point Likert scale (0–3) assessed stress severity, while Part B used a 5-point scale with the 18-item IWPQ by Koopmans (2015) to analyse job performance elements: task performance, contextual performance, and counterproductive behavior, ranging from 0 (seldom/never) to 4 (always/often).

Δ Data Analysis & Interpretation:

Reliability & Validity:

SPSS 22.00 version analyzed data; reliability was assessed using Cronbach's alpha coefficient. In pilot testing, a questionnaire was filled by 102 respondents and the questionnaire-based reliability result shows Cronbach alpha value ranges from 0.651 to 0.808.

Demographic Details of the Respondents:

Demographic data was examined based on gender where females were led by percentage (i.e. 52%) than males (i.e. 50%). Analysis through frequency distribution on the respondents who have actively participated in the study was between 20-30 years (i.e. 64.7%). The result on the demographic factor i.e. marital status of the respondents who were ruling the study was unmarried (i.e. 63.7%). The respondents who participated in a higher ratio in the study in context to designation mostly belonged to the executive level i.e. (54.9%). Lastly, the demographic factor that evaluated the profile of the respondents was education, almost the maximum number of respondents were Post-graduate (i.e. 61.8%).

Association between job stress and job performance (Objective 1):

The association between job stress and performance was analyzed using descriptive statistics and Pearson Correlation with SPSS. Results showed a positive but weak correlation ($r = .320$, $p < 0.01$). Job stress slightly increased during COVID-19, affecting task and contextual performance, with counterproductive behaviors being low.

To assess the level of Job stress (Objective 2):

A Chi-square was performed to interpret the stress level using the SPSS 22.00 version. The level of job stress of male and female respondents was identical. Women faced the dual burden of domestic responsibilities and hospital duties, often encountering pandemic-related challenges. Men, on the other hand, focused on social and financial concerns, frequently working overtime. Female employees balanced childcare and eldercare while also attending to patients and visitors, increasing their risk of infection. Both genders worked in high-risk environments, such as isolation wards and containment zones. During the pandemic, additional work hours were required of all, with no gender-based preferences, leading to equal levels of job stress for both men and women.

Δ **Discussion:**

The study focused on 102 healthcare administrative personnel with two main objectives: to explore the association between job stress and performance and to assess job stress levels during the COVID-19 pandemic. Conducted in West Bengal via a web-based questionnaire, the study highlighted stress factors such as fear of isolation, discomfort from protective equipment, and patient care burdens. Key findings showed fear of social isolation ($M = 3.35 \pm 0.908$) as the primary stressor. Despite stress, job performance remained high, with task performance ($M = 3.19 \pm 0.992$) and contextual performance ($M = 3.02 \pm 1.169$) indicating positive outcomes.

Δ **Limitations:**

The study has several limitations: it was cross-sectional, focused on private hospital administrative health workers in West Bengal, and relied on self-reported data via Google Forms. Only job stress and performance were explored, neglecting other factors. Additionally, it measured only gender-based stress and had a limited sample due to COVID-19.

Δ **Conclusion:**

This study explores employee psychological states, performance, job stress, and strategies for enhancing productivity in healthcare organizations.

References

1. Pradhan, R. K., Panda, M., Hati, L., Jandu, K., & Mallick, M.(2023) Impact of COVID-19 stress on employee performance and well-being: role of trust in management and psychological capital. *Journal of Asia Bussiness Studies*.
2. Saleem, F., Malik, M. I., & Qureshi,S.S.(2021)Work Stress Hampering Employee Performance During COVID-19: Is Safety Culture Needed?. *Frontiers in Psychology,*12, Article 655839.
3. Kumari, P., Bajwa, A., & Priya, B. (2016).Relationship between stress and job performance: A study of banking sector. *International Journal of Business Quantitative Economics and Applied Management Research,* 2(12).
4. Murali.B.S, Basit.A, Hassan.Z(2017) Impact of job stress on employee performance. I*nternational Journal of Accounting and Business Management,* 5(2), 13-33.
5. Vijayan.M(2018)Impact of Job Stress on employees job performance in Aavin Coimbatore.*Journal of Organisation & Human Behaviour,* 6, 21-29.
6. Rasheed, M.I. and Nisar, S.K. (2019) Stress and Performance: Investigating Relationship between Occupational Stress, Career Satisfaction, and Job Performance of Police Employees.*Journal of Public Affairs,* 20, e1986.
7. Kuo.F.L,Yang.P.H, Hsu.H.T, Su.Y.S, Chen.C.H, Yeh.I.J, Wu.Y.H, Chen.L.C(2020) Survey on perceived work stress and its influencing factors among hospital staff during the COVID-19.*The Kaohsiung Journal of Medical Sciences,* 36, 944-952.
8. Xie J, Liu Q, Jiang X, Manandhar U, Zhu Z, Li Y and Zhang B (2021) Psychological Health Issues of Medical Staff During the COVID-19 Outbreak. *Front.Psychiatry* 12:611223.
9. Frost, D. M., Meyer, I. H., & Schwartz, S. (2017). Social support networks among diverse sexual minority populations. *American Journal of Orthopsychiatry,* 86(1), 91–102.
10. Otonín Rodríguez, B., & Lorca Sánchez, T. (2020). The psychosocial impact of COVID-19 on health care workers. *International Brazilian Journal of Urology,* 46(Suppl 1), 195–200.

11. Nkansah, D., Gyimah, R., Agyemfour-Agyemang Sarpong, D., & Annan, J. K. (2023). The effect of employee engagement on employee performance in Ghana's MSMEs sector during COVID-19: The moderating role of job resources. *Open Journal of Business and Management,* 11(1).
12. Ahmed, A., & Ramzan, M. (2013). Effects of job stress on employees' job performance: A study on the banking sector of Pakistan. *Journal of Business and Management*, 19(3), 41-50.
13. Kumari.P, Bajwa.A, Priya.B(2016) Relationship between Stress and Job performance:A Study of Banking sector. *International Journal of Business Quantitative Economics and Applied Management Research*, 2(12).
14. Fokeng,C.(2018). *Effects of job-stress on employee performance in an enterprise* (Master's thesis, Centria University of Applied Sciences).

12 The Role of Agile Leadership in Modern hospital Management: Adapting to Change with Speed and Precision

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Abstract:
Agile leadership has emerged as a vital approach in modern management, emphasizing adaptability, collaboration, and responsiveness to navigate the complexities of today's dynamic business environments. Contrasting traditional hierarchical models, agile leadership fosters decentralized decision-making, empowering cross-functional teams to innovate and respond swiftly to change. Rooted in agile software development practices, this leadership style prioritizes continuous learning, customer-centric strategies, and iterative progress, enabling organizations to remain resilient amidst market volatility and technological advancements. By embracing agile principles, leaders cultivate cultures of continuous improvement and innovation, ensuring long-term sustainability and competitive advantage in an ever-evolving global landscape.
Keywords: *Agile leadership, hospital Management, Speed, Precision.*

Δ Introduction

Agile leadership became very important in the domain of modern management , it increase adaptability, strength, and collaborate it is very helpful for ever changing business environment. Unlike traditional leadership models that rely on hierarchical structures and rigid decision-making processes, agile leadership fosters flexibility and responsiveness, enabling organizations to navigate uncertainty and disruption more effectively (Rigby, Sutherland, & Takeuchi, 2018). Agile methodologies are very much useful in software development, where continues progress, feedback of customer, and cross-functional teamwork are prioritized. Over time, agile principles became

very important to leadership and management, in continuous improvement and innovation across industries (Denning. 2018). By incorporating agility into leadership, organizations can enhance their ability to pivot in response to market shifts, technological advancements, and competitive pressures, ensuring long-term sustainability (McKinsey & Company, 2020).With the advent of globalization and transformation in the digital domain along with economic outbursts in shaping industries, organizations must quickly habituate themselves towards emerging challenges and opportunities (Deloitte Insights, 2019). Acceptance of agile leadership by companies help anticipate market trends, along with implementation of various strategic changes while maintaining a consumer-centric approach towards decision-making (Highsmith, 2019). Instead of static and long-term strategic plans that often fail to account for rapid shifts in external conditions companies, implementing agile leadership provides great emphasis upon risk management, ceaseless learning and real-time problem-solving (Aghina et al., 2021).

Δ **Agile Leadership**

Agile leadership is a way to help organizations deal with complex and changing situations. It comes from the Agile Methodology, which was primarily brought forward for software development. Agile leadership focuses on being flexible, working together, and always improving. This idea goes back with the advent of Agile Manifesto in 2001 aimed at fixing problems discovered in outmoded or traditional software methods. Eventually, these ideas have been incorporated into various corporate sectors, upskilling them to be prompt at responding to market changes. Agile leadership is primarily defined as the ability to introduce new idea while encouraging continuous learning. This in turn assists teams to work independently, creating a key approach for organisations facing uncertain problem scenarios. Contrary to traditional leadership that solely depends on rigid structures and hierarchical chain of commands, agile leadership encourages people-centric decision-making, where leaders act as facilitators rather than authoritative figures (Denning, 2018). This revolutionary method allows organizations to provide rapid response to changes while prioritizing experimentation, incremental progress, and continuous feedback loops (Appelo, 2016). Additionally, agile leadership fosters a customer-centric approach, ensuring that business objectives align closely with user needs and market expectations. By embracing transparency, open communication, and cross-functional collaboration, agile leaders create an environment that nurtures creativity and problem

solving at all levels of the organization (Laloux, 2014).A fundamental distinction between traditional leadership and agile leadership lies in their respective approaches to change and uncertainty.

In modern management needs of agile leadership

Agile Methodology originally developed for software development, agile leadership emphasizes flexibility, collaboration, and continuous improvement. The origins of agile leadership can be traced back to the Agile Manifesto, which was introduced in 2001 as a response to inefficiencies in traditional software development practices (Beck et al., 2001). Over time , these principles have transcended software development and have been widely adopted across various industries, helping organizations become more responsive to evolving market demands. Agile leadership is distinguished by its ability to foster innovation, promote a culture of learning, and enhance team autonomy. Making it an essential framework for organizations operating in volatile environments (Rigby, Sutherland, & Takeuchi, 2018)The actual principles of agile leadership is adaptability, repetitive decision-making, and increase power of teams. Not like traditional leadership which stay on rigid structures and higher authority to lower authority command chains, agile leadership increase decentralized decision , in this case role of leader is encouraging and helping not giving order (Denning, 2018). Shifting traditional leadership to agile leadership helps organizations to respond easily to changes by experimentation, increasing progress, and continuous feedback loops (Appelo, 2016). Additionally, this leadership increase a customer-centric approach, and align business objectives with user needs and market expectations. By increasing transparency and open communication, and cross-sectional collaboration, agile leaders create an situation that nurtures creativity and problem-solving at each levels of the organization (Laloux, 2014).A difference between traditional leadership and agile leadership stay in their approaches to change and uncertainty.

Key Components

Agile leadership is an ever-evolving paradigm that fosters adaptability, resilience, and strategic decision-making in organizations operating in dynamic environments. This leadership approach integrates an innovative vision, continuous learning, empowerment, data-driven decision-making, and the development of self-sustaining teams to ensure organizations remain competitive, flexible and responsive to change (Brown, 2021). As organizations navigate complex challenges, agile leadership becomes a

crucial aspect towards innovation and sustainable success.A key component of agile leadership is vision and strategic thinking, which enables leaders to align teams with organizational goals. Leaders who possess a clear vision articulate long-term objectives while remaining flexible in response to external changes (Smith & Johnson, 2020). These agile leaders establish a shared purpose. This shared purpose in turn enhances team motivation and cohesion, ensuring that employees are conscious of the company's broader mission and take a strategic approach towards achieving this mission. This strategic foresight allows organizations to anticipate industry trends and proactively address potential technical disruptions (Williams, 2022). Effective communication ensure employee will be clear about there roll in all level (Anderson, 2021).

Frameworks and Models

Foundational elements of agile leadership is the Agile Manifesto, which was initially developed to guide software development but has since influenced broader organizational practices (Highsmith, 2009). The manifesto's core values—individuals and interactions over processes and tools, working solutions over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan—underscore the need for leaders who prioritize adaptability and empowerment (Rigby, Sutherland, & Takeuchi, 2016). This shift challenges traditional command-and-control leadership styles, necessitating a transition toward a facilitative and coaching-oriented approach (Denning, 2018). Agile leaders serve as enablers rather than enforcers, creating environments where teams can thrive through self-organization and collective problem-solving (Moe, Dingsøyr, & Dybå, 2010).Within agile frameworks, the Scrum Leadership Model exemplifies the principles of servant leadership, a concept that emphasizes the leader's role in supporting team members rather than directing them (Van Vugt, Hogan, & Kaiser, 2008). Scrum Masters, a key role within Scrum teams, function as servant leaders by fostering collaboration, removing impediments, and ensuring alignment with agile principles (Schwaber & Sutherland, 2020). Research suggests that servant leadership in agile environments develops team morale, productivity, and overall effectiveness, proving that leadership should be fluid and adaptive (Robert K. Greenleaf Center for Servant Leadership, 2016).

Role of Agile Leadership

Agile leadership is an important way to handle changes in today's fast business world. Agile leaders focus on being flexible, learning, and working

together to create change. They help create a culture that welcomes new ideas. By taking small steps and letting team members make decisions, agile leaders encourage everyone to participate in the change. This teamwork makes sure that changes meet the needs of everyone involved.A big challenge in managing change is that people often resist it because they are afraid or unsure about leaving old ways behind. Agile leaders help reduce this resistance by using simple ideas like being open, giving feedback, and taking small steps. They keep communication clear to build trust among employees, which helps find and fix problems. Agile leaders also let teams try new ideas in safe spaces before making big changes. This helps people get used to new methods gradually. Studies show that companies using agile change management have more support from employees and work better.A key part of agile leadership is encouraging a culture of trying new things and being creative.

Δ Future of Agile Leadership in Management

Looking into the future, the picture of agile leadership in management is shaped by new trends that are constantly updating the work environment. Since organizations are adopting digital platforms increasingly, it is important for leaders to integrate agile methods with new technology to remain competitive. One of the trends shaping agile leadership is merging artificial intelligence (AI) with automation. AI-powered analytics provide leaders with real-time insights, leading to improved decision-making and future-proofing of plans. Further, automation simplifies repetitive steps, allowing leaders to focus on strategic plans that drive growth. Empirical evidence suggests that organizations leveraging AI-powered agility experience an unprecedented increase in efficiency and innovation(Wilson & Thomas, 2024).The transition to remote and hybrid working environments brings the need for agile leadership to the forefront. With workers scattered over different locations, collaborative working, productivity, and engagement demand elastic leadership styles.

Δ Conclusion

Firstly, A culture of flexibility and continuous learning must be incorporated. Helping employees improve their skills to meet changing business needs will promote agility within the workplace. Second, provide for an area where feedback shall be shared. This will help organizations quickly adapt to market changes. Teams encouraging open communication shall also support agile practices. Along with these practices, future digital trends like the implementation of AI and data-driven decision making shall help support these organisations.Leadership training should be focused

on teaching emotional intelligence, flexibility, and IT skills to prepare prospective leaders for evolving business environments. Organizations should be open to invest in training that combines flexible approaches, crisis management, and IT skills together to develop strong agile leaders. Moreover, implementing flexible work policies that shall support remote work will help organizations stay competitive in this digital age where work is not fixed to a single domain but through the juxtaposition of office spaces and virtual rooms.Future research on agile leadership must be focusing on how artificial intelligence and automation affect the quality of leaders. Studies on AI decision-making will provide insights into effective leadership practices. Also, exploring the emotional aspects of agile leadership, like resilience and emotional intelligence, will help create better leadership models. Research should also examine how agile leadership practices can be adapted for different industries.By adopting agile leadership principles and keeping up with new trends, organizations can create strong and innovative teams that can handle complex business challenges. Ongoing research and development in agile leadership will continue to improve its use, helping businesses stay competitive and ready for the future.

References

1. Aghina, W., De Smet, A., Lackey, G., Lurie, M., & Murarka, M. (2021). *The journey to an agile organization: A McKinsey Global Survey.* McKinsey & Company.
2. Appelo, J. (2016). *Managing for happiness: Games, tools, and practices to motivate any team.* Wiley.
3. Bass, B. M. (2016). *Transformational leadership.* Routledge.
4. Deloitte Insights. (2019). *Leading the social enterprise: Reinvent with a human focus*. Deloitte University Press.
5. Denning, S. (2018). *The age of agile: How smart companies are transforming the way work gets done.* AMACOM.
6. Laloux, F. (2014). *Reinventing organizations: A guide to creating organizations inspired by the next stage of human consciousness.* Nelson Parker.
7. McKinsey & Company. (2020). *Agility in a time of crisis: McKinsey Global Survey results.* McKinsey & Company.

8. Rigby, D. K., Sutherland, J., & Takeuchi, H. (2018). *Doing agile right: Transformation without chaos*. Harvard Business Review Press.
9. Aghina, W., De Smet, A., Lackey, G., Lurie, M., & Murarka, M. (2021). *The journey to an agile organization: A McKinsey Global Survey.* McKinsey & Company.
10. Appelo, J. (2016). *Managing for happiness: Games, tools, and practices to motivate any team.* Wiley.
11. Bass, B. M. (2016). *Transformational leadership.* Routledge.
12. Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., ... & Thomas, D. (2001). *Manifesto for Agile Software Development.* Agile Alliance.
13. Joiner, B. (2019). *Leadership agility: Five levels of mastery for anticipating and initiating change.* Wiley.
14. Laloux, F. (2014). *Reinventing organizations: A guide to creating organizations inspired by the next stage of human consciousness.* Nelson Parker.
15. McKinsey & Company. (2020). *Agility in a time of crisis: McKinsey Global Survey results.* McKinsey & Company.
16. Rigby, D. K., Sutherland, J., & Takeuchi, H. (2018). *Doing agile right: Transformation without chaos.* Harvard Business Review Press.
17. Rigby, D. K., Elk, S., & Berez, S. (2020). *Agile: Revolutionizing the way we manage.* Harvard
18. Highsmith, J. (2019). *Agile project management: Creating innovative products.* Pearson Education.
19. Joiner, B. (2019). *Leadership agility: Five levels of mastery for anticipating and initiating change*. Wiley.
20. Laloux, F. (2014). *Reinventing organizations: A guide to creating organizations inspired by the next stage of human consciousness*. Nelson Parker.
21. Nelson, S., & Green, P. (2020). *Self-managing teams: The cornerstone of agile organizations.* Stanford University Press.
22. Parker, J., & Adams, L. (2020). *Psychological safety and team performance in agile settings.* Cambridge University Press.
23. Bennett, N., & Lemoine, G. J. (2014). *What a difference a word makes: Understanding threats to performance in a VUCA world.* Business Horizons, 57(3), 311-317. https://doi.org/10.1016/j.bushor.2014.01.001

24. Cooper, R. G., & Sommer, A. F. (2016). The Agile-Stage-Gate hybrid model: A promising new approach and a new research opportunity. *Journal of Product Innovation Management*, 33(5), 513-526. https://doi.org/10.1111/jpim.12314
25. Denning, S. (2018). *The age of agile: How smart companies are transforming the way work gets done.* AMACOM.
26. Edmondson, A. C. (2018). *The fearless organization: Creating psychological safety in the workplace for learning, innovation, and growth.* Wiley.
27. Greenleaf, R. K. (1977). *Servant leadership: A journey into the nature of legitimate power and greatness.* Paulist Press.
28. Rigby, D. K., Sutherland, J., & Takeuchi, H. (2016). Embracing agile. *Harvard Business Review,* 94(5), 40-50.
29. Schwaber, K., & Sutherland, J. (2020). *The Scrum Guide: The definitive guide to Scrum: The*
30. Clark, P., Richards, T., & Evans, R. (2023). *Remote work and agile leadership: A new paradigm for the digital workforce*. Journal of Organizational Behavior, 38(4), 56-74.
31. Davis, K. (2023). *Crisis management and agility: A leadership perspective.* Leadership & Management Review, 29(3), 88-102.
32. Lopez, A., & Martinez, B. (2023). *The future of leadership: Skills for next-generation agile managers*. Journal of Business Strategy, 51(6), 145-162.
33. Smith, R., & Johnson, C. (2023). *Agile transformation: Overcoming resistance to change.* International Journal of Change Management, 17(1), 22-39.
34. Wilson, D., & Thomas, E. (2024). *AI and automation in agile leadership: The next frontier.* Technology and Business Review, 61(2), 78-94.

13 Evaluating Service Quality in Private Hospitals: Application of the SERVQUAL Model in West Bengal's Healthcare Sector

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Abstract

Parasuraman, along with two others, proposed the SERVQUAL model. The methodology seeks to evaluate service quality across five categories: "reliability", "responsiveness", "tangibility", "assurance", and "empathy". This study, based on data from 288 private hospital patients in West Bengal, used EFA, confirming suitability (KMO = 0.777, $p < 0.05$) and high reliability (Cronbach's α 0.995). AVE values (0.823–0.970) validated convergent and discriminant validity. Tangibility and reliability emerged as dominant dimensions, while other dimensions significantly influenced patient satisfaction.

Key Words: *Service Quality, SERVQUAL, Patient Satisfaction, Reliability, Tangibility*

Δ Introduction

The SERVQUAL model, initially formed by Parasuraman, Zeithaml, and Berry, serves as effective instrument for evaluating service quality, particularly in corporate or private hospitals, where patient satisfaction is a critical factor for success [12]. Our methodology may determine service quality across[5] fundamental dimensions: "**responsiveness", "reliability", "tangibility", "assurance**", and "**empathy**". Upon discovering discrepancies between patient expectations and their views of service delivery, SERVQUAL offers hospital administrators insights to improve service quality.[9,11] The healthcare industry of West Bengal is experiencing skyrocketing growth[5,10], attracting

patients from various regions, including neighbouring countries such as Bangladesh, Bhutan, Nepal, and others [1,2]. The SERVQUAL model, with its ability to assess systematically and address service quality dimensions, emerges as a crucial tool for achieving these objectives. Apart from its utility, the original SERVQUAL model was criticized, many researchers were devoted to modifying and contextualizing it. For example, the SERVPERF model which had been suggested by Cronin and Taylor, omitted the expectation part, focusing mainly on performance itself in a way to reduce response bias and simplify the assessment process [13]. In the healthcare context, dimensions for example clinical outcome quality and communication have been added to better reflect patient satisfaction, as seen in Lam's work[8]. On the other hand, in the year 1990 **Carman** suggested adopting the **SERVQUAL** dimensions to specific industries, resulting in customized healthcare-focused models [3]. There are some researchers who have integrated SERVQUAL and PROMs i.e. **patient-reported outcome measures.** Here patient safety and accessibility, addressing unique challenges in hospital environments are included as dimensions [4,7]. Some other groups of researchers have imposed weighted scoring methods in a way to measure[5] dimensions of SERVQUAL model [6]. These modifications, when applied in the West Bengal context, can make the SERVQUAL model more practical tools to enable healthcare providers to assess the significant needs of a growing and diverse patient base effectively.

Δ Methodology

In this study we have collected data from those people who are getting service from the corporate hospital in north 24 parganas, West Bengal. The current research seeks to assess service quality in corporate hospitals utilizing the SERVQUAL methodology provided by Parasuraman et al[12]. The research was conducted with a sample of 288 patients who were receiving services from corporate hospitals. Convenient sampling was employed to select participants for the study. Only patients who were mentally sound and willing to participate were included. Utilizing the SERVQUAL methodology, we have constructed a structured questionnaire with 21 items examined on 5-point Likert scale, which ranged from "Strongly Disagree" to "Strongly Agree." Survey has been divided into two sections: **Demographic Information:** Captured the basic demographic profile of the respondents. **Service Quality Assessment:** Composed of 21 items that reflect 5 characteristics of SERVQUAL model: “Tangibility”, “Reliability”, “Responsiveness”, “Assurance”, and “Empathy”. The questionnaire was disseminated using Google Forms to facilitate accessibility and broaden participant engagement. After data

collection, the responses were compiled and imported into SPSS software for analysis. The following steps were undertaken: **Sampling Adequacy and Sphericity:** We generated the KMO statistic to evaluate sample adequacy and performed Bartlett's Test to examine sphericity, thereby assessing data's appropriateness for factor examination. **Factor Analysis:** "Exploratory Factor Analysis" (EFA) had been performed to regulate the fundamental characteristics of service quality. "Principal Component Analysis" (PCA) utilizing Varimax rotation was employed to elucidate the factorial structure. **Convergent and Discriminant Validity:** We employed the Fornell-Larcker Criterion for evaluating both the discriminant and convergent validity of the evaluation model.

Δ **Analysis**

KMO and Bartlett's Test		
KMO for Sampling Adequacy.		.777
Bartlett's Test for Sphericity	Value of Approx. Chi-Square	21927.078
	Degree of freedom	210
	P value	<.001

The analysis provides comprehensive validation of the five-dimensional structure of service quality—, "Responsiveness", "Reliability", "Tangibility", "Empathy", and "Assurance". The KMO Measure of Sampling Adequacy showed a satisfactory result (0.777), hence revealing a satisfactory level of sampling adequacy, on other hand "Bartlett's Test of Sphericity" shows significant result (χ^2 = 21,927.078, df = 210, $p<0.001$). Hence, we are now eligible to do factor analysis as both KMO and Bartlett are showing favourable results. The factor extraction revealed eigenvalues ranging from 8.834 in case of Tangibility to 1.490 in case of Assurance, collectively explaining a large enough area of the variance in our data. The reliability analysis, indicated by Cronbach's Alpha, demonstrates outstanding internal consistency, with values ranging from 0.995 for Assurance to 0.999 for

	Eigenvalue		Loading	Tangibility	Reliability	Responsiveness	Empathy	Assurance
Tangibility (AVE -0.882, CR-0.811, Alpha – 0.996)	8.834	TA_1	0.935	0.939				
		TA_2	0.942					
		TA_3	0.942					
Reliability (AVE – 0.970, CR-0.911, Alpha - 0.999)	6.745	REL_1	0.983	.412**	0.985			
		REL_2	0.985					
		REL_3	0.987					
		REL_4	0.985					
		REL_5	0.985					
		REL_6	0.986					
Responsiveness (AVE – 0.834, CR-0.667, Alpha – 0.995)	1.960	RES_1	0.906	.247**	0.025	0.913		
		RES_2	0.916					
		RES_3	0.917					
		RES_4	0.914					
Empathy (AVE – 0.857, CR-0.665, Alpha -0.995)	1.751	EMP_1	0.915	.223**	-0.066	.596**	0.926	
		EMP_2	0.925					
		EMP_3	0.936					
		EMP_4	0.933					
		EMP_5	0.921					
Assurance (AVE – 0.823, CR-0.710, Alpha – 0.995)	1.490	ASU_1	0.906	.262**	-0.043	.531**	0.547	0.907
		ASU_2	0.908					
		ASU_3	0.909					

Reliability, above the required threshold of 0.7. Construct validity was supported as in every case there are higher "Average Variance Extracted" (AVE) values, which that ranged from 0.823 in case of Assurance to 0.970 in case of Reliability, they are all exceeding the 0.5 cut-off mark and hence we can conclude we adequate convergent validity is prevailing. The "Composite Reliability" (CR) ratings for all constructs varied from 0.667 (Responsiveness) to 0.911 (Reliability), that indicates the constructs' consistency and stability over repeated measures. Factor loading of every observed variable exceeded the minimum criteria that are 0.7, as they all ranged from 0.906 to 0.987, Tangibility (AVE = 0.882, CR = 0.811), and Reliability (AVE = 0.970, CR = 0.911) are proved to be the most dominant dimensions, they are playing a crucial role in service quality evaluation. Apart from that other dimension i.e., Responsiveness (AVE = 0.834, CR = 0.667), Empathy (AVE = 0.857, CR = 0.665), and Assurance (AVE = 0.823, CR = 0.710) also showing high reliability and validity. On the other hand, Inter-construct correlations revealed meaningful associations, with moderate overlaps observed between Responsiveness and Empathy (r = 0.596) and between Empathy and Assurance (r = 0.531). This suggests shared

influences across constructs, particularly in aspects of customer care and perceived assurance of quality. Overall, the analysis shows satisfactory result of reliability and validity of the all the five dimensions in a way to assess the service quality. But among those five 2 are proved to be most influential i.e. Tangibility and Reliability. However, the moderate correlations between some dimensions highlight the need for further refinement, particularly in differentiating shared characteristics of related constructs.

Δ Conclusion

The current study underscores the efficacy of SERVQUAL approach in assessing service quality and patient satisfaction in private hospitals located in North 24 Parganas, West Bengal. Tangibility and reliability emerged as essential qualities, supported by responsiveness, empathy, and certainty. As West Bengal's healthcare sector attracts patients regionally and internationally, focusing on service quality is vital. Incorporating healthcare-specific dimensions like clinical outcomes and communication can enhance the model. These findings guide hospital administrators in improving service delivery and understanding patient needs in a competitive market.

References

1. Aich, A., & Banerjee, K. (2023). Health care service trade in the South East Asian region: Particularly in BIMSTEC. *International Journal of Advance and Innovative Research,* 10(1), 24-31.
2. Ali, M. M., & Medhekar, A. (2016). Globalization, medical travel and healthcare management in Bangladesh. *Problems and Perspectives in Management,* 14(2-2), 360–375. https://doi.org/10.21511/ppm.14(2-2).2016.12
3. Carman, J.M. (1990) Consumer Perceptions of Service Quality: An Assessment of the SERVQUAL Dimensions. *Journal of Retailing,* 66, 33-55.
4. Carter, S. R., Ng, R., El-Den, S., & Schneider, C. R. (2022). A patient-reported experience measure for community pharmacy including development of a short-form: The perceived service quality scale. *Research in Social and Administrative Pharmacy,* 18(8), 3369-3378.

5. Chakraborty, S. N., Bhattacherjee, S., & Rahaman, M. A. (2016). A cross-sectional study on patient satisfaction in an urban health care centre of Siliguri Municipal Corporation, Darjeeling, West Bengal. *Medical Journal of Dr. DY Patil University,* 9(3), 325-330.
6. Jain, S. K., & Gupta, G. (2004). Measuring service quality: SERVQUAL vs. SERVPERF scales. *Vikalpa*, 29(2), 25-38.
7. Knapp, A., Harst, L., Hager, S., Schmitt, J., & Scheibe, M. (2021). Use of patient-reported outcome measures and patient-reported experience measures within evaluation studies of telemedicine applications: systematic review. *Journal of medical Internet research,* 23(11), e30042.
8. Lam, S. S. (1997). SERVQUAL: A tool for measuring patients' opinions of hospital service quality in Hong Kong. *Total quality management,* 8(4), 145-152.
9. Liang, Z. (2023). *Evaluating the relationships between perceived patient value, patient satisfaction and loyalty by inpatients at a tertiary public hospital in China* (Master's thesis).
10. Nag, A., Das, N., & Bose, I. (2024). Quality of Healthcare Service in West Bengal: The Perspective of Public Private Partnership Model. *Indian Journal of Industrial Relations*, 59(3).
11. Naung, N. K. L. (2024). *The effect of service quality and customer relationship management on customer satisfaction and revisit intention towards Quality Care Aesthetic Clinic* (Master's thesis, Yangon University of Economics).
12. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing,* 49(4), 41–50. https://doi.org/10.2307/1251430
13. Taylor, S. A., & Cronin Jr, J. J. (1994). An empirical assessment of the SERVPERF scale. *Journal of Marketing Theory and Practice*, 2(4), 52-69.

14 Endometriosis: Diagnostic Challenges and Emerging Therapies

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Abstract

Endometriosis is a chronic, estrogen-dependent condition affecting approximately 10% of reproductive-age women worldwide. Characterized by pelvic pain, dysmenorrhea, and infertility, it remains underdiagnosed due to nonspecific symptoms, cultural stigma, and reliance on invasive procedures like laparoscopy. This diagnostic delay often spans 7 to 10 years, impacting quality of life and disease progression. Recent research has focused on non-invasive diagnostic methods, including biomarkers in blood, urine, and menstrual effluent, as well as microRNA and epigenetic profiling. Advanced imaging techniques such as 3D ultrasound and diffusion-weighted MRI, alongside artificial intelligence tools, show promise in improving early detection. Therapeutic advancements include immunomodulatory agents, selective hormone receptor modulators, gene therapy, and regenerative medicine. While these developments are promising, most remain in early stages and require further validation. A multidisciplinary, patient-centered approach is essential to improve timely diagnosis and care for individuals affected by endometriosis.

Keywords: *Endometriosis, Diagnosis, Biomarkers, Imaging, Artificial Intelligence, MicroRNAs, Regenerative Medicine.*

Δ Introduction

Endometriosis is a chronic, estrogen-dependent inflammatory condition characterized by the presence of endometrial-like tissue outside the uterine cavity, leading to pelvic pain, dysmenorrhea, dyspareunia, and infertility (Zondervan et al., 2020). It affects approximately 10% of reproductive-age women globally, making it one of the most common gynecological

disorders (World Health Organization [WHO], 2021). Despite its prevalence, endometriosis remains underdiagnosed and misdiagnosed, with an average diagnostic delay of 7 to 10 years from symptom onset (Fuldeore & Soliman, 2017). This delay is often attributed to the nonspecific nature of symptoms, lack of non-invasive diagnostic tools, and sociocultural stigma surrounding menstruation and pelvic pain (Ballweg, 2004; Denny & Mann, 2007).

Current diagnostic methods rely heavily on invasive procedures, such as laparoscopic visualization and histological confirmation, which, while considered the gold standard, pose significant barriers to timely diagnosis (Gupta et al., 2020). Recent advances in imaging techniques, biomarker research, and artificial intelligence hold promise for earlier, less invasive diagnosis. Similarly, while hormonal therapies and surgical interventions are the mainstays of treatment, emerging therapies including immune-modulating drugs, gene-targeted treatments, and regenerative medicine are expanding the therapeutic landscape (Chapron et al., 2019).

Endometriosis continues to pose significant challenges in both diagnosis and treatment despite its high prevalence among women of reproductive age. This review explores the key diagnostic challenges associated with endometriosis and evaluates the latest developments in therapeutic strategies aimed at improving outcomes for individuals living with this debilitating condition.The literature reflects a growing awareness of the inadequacies in current clinical approaches and a shift toward exploring innovative diagnostics and therapies.

Δ Diagnostic Challenges

The gold standard for diagnosing endometriosis remains laparoscopic surgery with histological confirmation, which, although effective, is invasive and contributes to the diagnostic delay (Zondervan et al., 2020). Many patients experience symptoms for years before receiving a definitive diagnosis, often being misdiagnosed with other conditions like irritable bowel syndrome (IBS) or pelvic inflammatory disease (Fuldeore & Soliman, 2017). Studies indicate that this delay ranges from 7 to 10 years on average, during which time the disease may progress and negatively affect quality of life (Ballweg, 2004). Several factors contribute to this delay, including normalization of menstrual pain, inadequate awareness among general practitioners, and cultural taboos surrounding menstruation (Denny & Mann, 2007). In a qualitative study, women reported feeling dismissed by healthcare professionals, which further delayed intervention (Quinn et al., 2014). Recent research has focused on identifying non-invasive biomarkers in blood, urine, and menstrual effluent that may aid

early diagnosis. However, these biomarkers currently lack the sensitivity and specificity needed for clinical application (Gupta et al., 2020). Imaging modalities such as transvaginal ultrasound and magnetic resonance imaging (MRI) have improved detection of deep infiltrating endometriosis but remain limited for superficial or peritoneal lesions (Chapron et al., 2019).

Δ Emerging Therapies

Traditional treatment options for endometriosis include hormonal therapies (e.g., oral contraceptives, progestins, GnRH agonists) and surgical excision of lesions. While effective in symptom relief, these treatments are not curative and often come with side effects or risk of recurrence (Zondervan et al., 2020). The literature has increasingly focused on novel therapeutics aimed at modulating the immune and inflammatory responses involved in endometriosis. Anti-inflammatory agents, angiogenesis inhibitors, and immunomodulators such as pentoxifylline are currently under investigation (Chapron et al., 2019). Additionally, there is interest in selective progesterone receptor modulators (SPRMs) and aromatase inhibitors, which offer hormonal control with potentially fewer side effects (Donnez & Dolmans, 2017). Emerging technologies such as gene therapy and stem cell-based regenerative approaches have shown promise in preclinical studies. These aim to repair damaged tissues and reduce lesion formation through targeted interventions (Zhang et al., 2021). Digital health tools and AI-powered apps are also being integrated into patient monitoring and personalized treatment planning, although more evidence is needed to support their widespread clinical use.

Δ Novel Methods to Diagnose Endometriosis

Endometriosis presents a major diagnostic challenge due to the limitations of current methods, which often rely on invasive laparoscopy. As such, researchers are actively exploring novel, less-invasive diagnostic techniques. These emerging methods focus on the identification of reliable biomarkers, advanced imaging techniques, and the application of artificial intelligence (AI) in clinical assessment.

- **Biomarker-Based Diagnostics**
  One of the most actively researched areas is the identification of non-invasive biomarkers in blood, urine, saliva, and menstrual effluent. These biomarkers aim to reflect the inflammatory, hormonal, or immune dysfunctions characteristic of endometriosis. Studies have evaluated serum CA-125, interleukin-6 (IL-6), and vascular endothelial growth factor (VEGF) levels as potential diagnostic markers, but these lack sufficient sensitivity and specificity to be used as standalone tools (May et al., 2010; Gupta et al., 2020).

More recent efforts have focused on microRNAs (miRNAs)—small non-coding RNAs involved in gene regulation. Certain miRNAs, such as miR-200 family and miR-17-5p, have shown promise in distinguishing women with and without endometriosis, although larger validation studies are needed (Rekker et al., 2018).

- **Menstrual Blood and Endometrial Tissue Analysis**
  The use of menstrual effluent as a diagnostic sample has gained traction due to its non-invasive nature and accessibility. Analysis of endometrial stromal cells, immune cell profiles, and gene expression patterns in menstrual blood has revealed distinct markers in individuals with endometriosis (Brosens et al., 2017). This approach may be especially useful in early detection and screening.
- **Advanced Imaging Techniques**
  While transvaginal ultrasound (TVUS) and MRI are commonly used, novel imaging techniques are improving diagnostic accuracy. The use of 3D ultrasound, elastography, and contrast-enhanced imaging has enhanced the detection of deep infiltrating endometriosis (DIE) and ovarian endometriomas (Exacoustos et al., 2014). Moreover, MRI with diffusion-weighted imaging (DWI) has shown improved visualization of subtle lesions and pelvic adhesions (Bazot et al., 2011).
- **Artificial Intelligence and Machine Learning**
  Artificial intelligence (AI) and machine learning algorithms are being applied to medical imaging and clinical data to improve diagnostic predictions. AI-based tools can integrate clinical symptoms, hormone profiles, imaging results, and genetic markers to enhance diagnostic accuracy (Vodolazkaia et al., 2021). While still in early development, these tools hold potential to support earlier and more reliable diagnoses in routine practice.
- **Genetic and Epigenetic Profiling**
  Emerging studies have highlighted the potential of genomic and epigenetic profiling in identifying susceptibility and presence of endometriosis. Single nucleotide polymorphisms (SNPs) in genes involved in estrogen metabolism and inflammation pathways have been linked to the disease (Nyholt et al., 2012). Similarly, epigenetic modifications, such as DNA methylation of HOXA10 and ESR1 genes, are under investigation as diagnostic indicators (Yamagata et al., 2021).

Δ Conclusion:

Endometriosis remains a complex and underdiagnosed condition that significantly impairs the quality of life for millions of women worldwide. The persistent reliance on invasive laparoscopic procedures for definitive diagnosis contributes to delays in treatment and long-term complications such as infertility and chronic pain. This underscores the urgent need for earlier, more accurate, and less invasive diagnostic methods. Recent research into non-invasive biomarkers, advanced imaging techniques, and novel data-driven tools like artificial intelligence offers promising avenues for revolutionizing the diagnostic landscape. Similarly, therapeutic advancements from hormonal innovations to immunomodulatory treatments and regenerative medicine are gradually reshaping the management paradigm for endometriosis, moving toward more personalized and effective care.

However, these novel approaches are still largely in the developmental or early clinical stages. Robust validation through large-scale, multicenter studies is crucial before they can be widely implemented. Moreover, increasing awareness, reducing diagnostic stigma, and integrating multidisciplinary approaches in clinical practice will be key to improving patient outcomes. In conclusion, while substantial progress is being made, a concerted global effort involving research, policy reform, and education is essential to close the diagnostic gap and ensure accessible, timely, and effective care for all individuals affected by endometriosis.

References

1. Ballweg, M. L. (2004). Impact of endometriosis on women's health: Comparative historical data show that the earlier the onset, the more severe the disease. *Best Practice & Research Clinical Obstetrics & Gynaecology,* 18(2), 201–218. https://doi.org/10.1016/j.bpobgyn.2004.01.003
2. Bazot, M., Darai, E., Hourani, R., Thomassin, I., Cortez, A., & Uzan, S. (2011). Deep pelvic endometriosis: MR imaging for diagnosis and prediction of extension of disease. Radiology, 240(3), 739–749. https://doi.org/10.1148/radiol.2403060612
3. Brosens, I., Puttemans, P., & Benagiano, G. (2017). Endometriosis: A modern syndrome. Indian Journal of Medical Research, 145(1), 44–48. https://doi.org/10.4103/ijmr.IJMR_2065_16

4. Chapron, C., Marcellin, L., Borghese, B., & Santulli, P. (2019). Rethinking mechanisms, diagnosis and management of endometriosis. *Nature Reviews Endocrinology,* 15(11), 666–682. https://doi.org/10.1038/s41574-019-0245-z
5. Denny, E., & Mann, C. H. (2007). Endometriosis and the primary care consultation. *European Journal of Obstetrics & Gynecology and Reproductive Biology,* 132(1), 105–108. https://doi.org/10.1016/j.ejogrb.2006.07.020
6. Donnez, J., & Dolmans, M. M. (2017). Endometriosis and medical therapy: From progestogens to progesterone resistance to GnRH antagonists: A review. Journal of Clinical Medicine, 6(6), 59. https://doi.org/10.3390/jcm6060059
7. Exacoustos, C., Malzoni, M., Di Giovanni, A., Lazzeri, L., Tosti, C., Petraglia, F., & Zupi, E. (2014). Ultrasound mapping system for the surgical management of deep infiltrating endometriosis. Fertility and Sterility, 102(1), 143–150.e2. https://doi.org/10.1016/j.fertnstert.2014.03.048
8. Fuldeore, M., & Soliman, A. M. (2017). Prevalence and symptomatic burden of diagnosed endometriosis in the United States: National estimates from a cross-sectional survey of 59,411 women. *Gynecologic and Obstetric Investigation,* 82(5), 453–461. https://doi.org/10.1159/000452660
9. Gupta, D., Hull, M. L., Fraser, I., Miller, L., Bossuyt, P. M., & Johnson, N. (2020). Endometrial biomarkers for the non-invasive diagnosis of endometriosis. *Cochrane Database of Systematic Reviews,* 2020(1). https://doi.org/10.1002/14651858.CD012165.pub2
10. Gupta, D., Hull, M. L., Fraser, I., Miller, L., Bossuyt, P. M., & Johnson, N. (2020). Endometrial biomarkers for the non-invasive diagnosis of endometriosis. Cochrane Database of Systematic Reviews, 2020(1). https://doi.org/10.1002/14651858.CD012165.pub2
11. May, K. E., Conduit-Hulbert, S. A., Villar, J., Kirtley, S., Kennedy, S. H., & Becker, C. M. (2010). Peripheral biomarkers of endometriosis: A systematic review. Human Reproduction Update, 16(6), 651–674. https://doi.org/10.1093/humupd/dmq009
12. Nyholt, D. R., Low, S. K., Anderson, C. A., Painter, J. N., Uno, S., Morris, A. P., ... & Montgomery, G. W. (2012). Genome-wide association meta-analysis identifies new endometriosis risk loci. Nature Genetics, 44(12), 1355–1359. https://doi.org/10.1038/ng.2445
13. Quinn, M., Fujimoto, V. Y., & Graham, J. (2014). Patient experiences with endometriosis: A qualitative study. Fertility and Sterility, 102(3), e248.

14. Rekker, K., Saare, M., Roost, A. M., Kaart, T., Soritsa, D., Karro, H., & Salumets, A. (2018). Circulating microRNA profile throughout the menstrual cycle. PLoS ONE, 13(2), e0190822. https://doi.org/10.1371/journal.pone.0190822
15. Vodolazkaia, A., El-Aalamat, Y., Popovic, D., Mihalyi, A., Bossuyt, X., Kyama, C., ... & Meuleman, C. (2021). Integration of artificial intelligence in the diagnosis of endometriosis: A pathway to early detection. Reproductive Sciences, 28(5), 1312–1322. https://doi.org/10.1007/s43032-021-00465-5
16. World Health Organization. (2021). Endometriosis. https://www.who.int/news-room/fact-sheets/detail/endometriosis
17. Yamagata, Y., Asada, H., Tamura, I., Lee, L., Maekawa, R., Taketani, T., & Tamura, H. (2021). DNA methylation status of HOXA10 gene in the endometrium of women with endometriosis. Journal of Human Genetics, 66(2), 215–222. https://doi.org/10.1038/s10038-020-00837-z
18. Zhang, T., De Carolis, C., Man, G. C. W., & Wang, C. C. (2021). The role of stem cells in the pathophysiology and therapy of endometriosis. Cells, 10(3), 703. https://doi.org/10.3390/cells10030703
19. Zondervan, K. T., Becker, C. M., & Missmer, S. A. (2020). Endometriosis. New England Journal of Medicine, 382(13), 1244–1256. https://doi.org/10.1056/NEJMra1810764

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Quantum Computing in Healthcare: Potential, Challenges, and Future Prospects

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Abstract
Quantum computing (QC) leverages superposition, entanglement, and parallelism to revolutionize healthcare by enhancing drug discovery, personalized medicine, and medical imaging. Its capacity to process large amounts of data at previously unheard-of rates offers significant advantages. However, high costs, system complexity, regulatory concerns, and security risks hinder adoption. The need for specialized expertise and seamless integration with existing systems further complicates implementation. Addressing these obstacles through investment, research, and policy creation is essential for realizing QC's full potential in healthcare.
Keywords: *Quantum Computing, Healthcare, Superposition, Drug Discovery, Data Security*

Δ Introduction

A sequence of bits representing information is the fundamental component of any classical computer. Two states are possible for bits: 0 and 1. Rather than using two bits, quantum computers use three bits. The laws of the quantum universe are followed by quantum computing. This quantum rule is a concept known as superposition. According to superposition, every possible state of any particle can be found at one time. The quantum computer uses 0, 1, and the superposition of 0 and 1, where both the

possibilities of 0 and 1 are present simultaneously. Together, these three bits are known as quantum bits or qubits. A phenomenon called quantum superposition is being proved by adding more bits. In superposition, 0 and 1 are both present at the same moment. Two more ideas must be applied in order to distinguish a quantum computer from superposition: quantum entanglement and parallelism. In the case of quantum entanglement – it is a state where a group of particles are generated and interacted, and they cannot be described independently. In the case of parallelism, a quantum computer can do many tasks at once. Researchers, scientists, and other R&D sectors worldwide focus on quantum computing technologies. Numerous top IT firms invest millions of dollars, like QuTech, IBM, and Intel. Quantum computers, according to scientists, can perform calculations much more quickly than a typical computer[12]. It's well known that quantum computers are capable of far superior performance and can tackle a wide range of issues in mathematics, physics, chemistry, and many other subjects[7]. Previously confined to theoretical realms, the idea of quantum computers has gained widespread attention in recent years. A quantum computer can be employed in machine learning and has much promise[10], Chemistry material science[13], along with optimization[16]. This paper will try to understand how quantum computing can bring about remarkable changes in healthcare sectors. Some of the applications and scope of quantum computing that researchers attempt to discover are listed below.

Δ Review of Literature

Quantum computing (QC) is set to revolutionize healthcare by leveraging superposition and entanglement to handle large amounts of data at rates faster than traditional computing (CC)[18]. Personalized medicine, drug discovery, along with medical imaging3 while addressing complex optimization challenges in medical data analysis[11]. It improves correlation mining in smart healthcare systems[11] and strengthens security protocols[14]. QC's transformative role in patient care and medical applications is well-supported[5], particularly in machine learning-driven heart disease detection9 and predictive healthcare analytics[1]. The transition to quantum computing (QC) in healthcare faces challenges such as data privacy, security, and infrastructure requirements[8]. Vulnerabilities in quantum cryptography necessitate robust security measures[17]. High costs and limited quantum resources hinder adoption[2,18], while a lack of specialized expertise calls for extensive training[15,4]. Regulatory concerns on data privacy and ethical implications require policy adaptation[17,6]. Additionally, interoperability between quantum and classical systems remains a hurdle[14], compounded by limited empirical validation of QC's healthcare benefits[14].

Δ Conclusion

Healthcare could transform thanks to quantum computing, which would make it possible to handle data more quickly and accurately for customized medicine, drug discovery, and medical imaging. However, high costs, system complexity, regulatory concerns, and security risks hinder widespread adoption. The need for specialized expertise and seamless integration with existing systems further complicates implementation. While theoretical benefits are well-documented, practical applications require further research and investment. Cooperation and creativity will be essential to overcome these barriers and fully realize quantum computing's potential in healthcare.

References

1. Abdulsalam, G., Meshoul, S., & Shaiba, H. (2023). Explainable heart disease prediction using ensemble-quantum machine learning approach. *Intelligent Automation & Soft Computing,* 36(1), 761-779. https://doi.org/10.32604/iasc.2023.032262
2. Aljaafari, M. (2023). Quantum computing for social business optimization: A practitioner's perspective. *Soft Computing*. https://doi.org/10.1007/s00500-023-08764-y
3. Arshad, M., Murtza, I., & Arshad, M. (2023). Applications of quantum computing in the health sector. *Journal of Data Science and Intelligent Systems,* 1(1), 19-24. https://doi.org/10.47852/bonviewjdsis3202656
4. Atadoga, A. (2024). Quantum computing in big data analytics: A comprehensive review: Assessing the advancements, challenges, and potential implications of quantum approaches in handling massive data sets. *Computer Science & IT Research Journal,* 5(2), 498-517. https://doi.org/10.51594/csitrj.v5i2.794
5. Chow, J. (2024). Quantum computing in medicine. *Medical Sciences,* 12(4), 67. https://doi.org/10.3390/medsci12040067
6. Elendu, C. (2024). Legal implications for clinicians in cybersecurity incidents: A review. *Medicine,* 103(39), e39887. https://doi.org/10.1097/md.0000000000039887
7. Feynman, R. P. (1982). Simulating physics with computers. *International Journal of Theoretical Physics*, 21, 467–488.

8. Jeyaraman, N. (2024). Revolutionizing healthcare: The emerging role of quantum computing in enhancing medical technology and treatment. *Cureus.* https://doi.org/10.7759/cureus.67486
9. Kumar, Y., Koul, A., Sisodia, P., Shafi, J., Kavita, K., Gheisari, M., … & Davoodi, M. (2021). Heart failure detection using quantum-enhanced machine learning and traditional machine learning techniques for the Internet of Artificially Intelligent Medical Things. *Wireless Communications and Mobile Computing,* 2021(1). https://doi.org/10.1155/2021/1616725
10. McClean, J. R., Boixo, S., Smelyanskiy, V. N., Babbush, R., & Neven, H. B. (2018). Plateaus in quantum neural network training landscapes. *Nature Communications,* 9, 4812.
11. Mei, P. (2024). A framework for processing large-scale health data in medical higher-order correlation mining by quantum computing in smart healthcare. *Frontiers in Digital Health,* 6. https://doi.org/10.3389/fdgth.2024.1502745
12. Nakamura, Y., Chen, C. D., & Tsai, J. S. (1997). Spectroscopy of energy-level splitting between two macroscopic quantum states of charge coherently superposed by Josephson coupling. *Physical Review Letters,* 79, 2328.
13. Peruzzo, A., Jarrod, M., Peter, S., Hong Yung, M., Zhou, X., Love, P. J., Guzik, A. A., & O'Brien, J. L. (2014). A variational eigenvalue solver on a photonic quantum processor. *Nature Communications,* 5, 4213. https://doi.org/10.1038/ncomms5213
14. Rasool, R., Ahmad, H., Rafique, W., Qayyum, A., Qadir, J., & Anwar, Z. (2023). Quantum computing for healthcare: A review. *Future Internet,* 15(3), 94. https://doi.org/10.3390/fi15030094
15. Shams, M. (2023). The quantum-medical nexus: Understanding the impact of quantum technologies on healthcare. *Cureus.* https://doi.org/10.7759/cureus.48077
16. Somma, R. D., Boixo, S., Barnum, H., & Knill, E. (2008). Quantum simulations of classical annealing processes. *Physical Review Letters,* 101, 130504.
17. Srikanth, P., & Kumar, A. (2022). Secure quantum computing for healthcare sector: A short analysis. *Security and Privacy*, 6(5). https://doi.org/10.1002/spy2.293
18. Ullah, U. (2024). Quantum machine learning revolution in healthcare: A systematic review of emerging perspectives and applications. *IEEE Access,* 12, 11423-11450. https://doi.org/10.1109/access.2024.3353461

16 Menstrual Health and Its Psychological Impact: Stress and Anxiety Links

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Abstract

Menstrual health is a critical yet often overlooked aspect of women's health with growing evidence highlighting its profound influence on psychological well-being. This paper explores the relationship between menstrual health and its impact on stress and anxiety, a connection that is under-researched despite its implications for mental health policies and clinical interventions. The review draws upon various studies to outline how menstrual disorders such as dysmenorrhea, premenstrual syndrome (PMS), and premenstrual dysphoric disorder (PMDD) correlate with elevated levels of psychological stress and anxiety. It also examines the bidirectional nature of this relationship, indicating how heightened stress and anxiety may in turn exacerbate menstrual irregularities. The paper further discusses biological, psychological, and sociocultural mediators influencing this association. Finally, it highlights the gaps in current research and the need for interdisciplinary studies to inform comprehensive menstrual and mental health management. Overall, understanding the nexus between menstrual health and psychological distress is vital to addressing the holistic health needs of menstruating individuals and reducing the burden of untreated mental health issues.

Keywords: *Menstrual Health, Stress, Anxiety, PMS, Dysmenorrhea, Mental Health*

Δ Introduction

Menstrual health is vital for influencing women's physical and mental wellness during their reproductive years (Stubbs et al., 2018). Menstruation is more than just a biological function.It is closely linked to emotional, psychological, and social dimensions as well (Gulati & Rahi, 2020). Problems such as irregular menstrual cycles, painful periods, premenstrual

syndrome (PMS), and premenstrual dysphoric disorder (PMDD) have been connected to mental health issues, especially stress and anxiety (Rapkin & Mikacich, 2022). However, despite these evident relationships, the interplay between menstrual health and mental health is frequently neglected in both public discourse and academic research (Osman et al., 2021). This paper aims to bridge that gap by reviewing existing literature and examining the impact of menstrual health on stress and anxiety.

There is an increasing recognition that hormonal fluctuations during the menstrual cycle can affect emotional stability, cognitive abilities, and susceptibility to mental health issues. In numerous societies, menstruation continues to be shrouded in stigma and misunderstanding, which can further contribute to psychological strain. By examining both the biological processes and sociocultural factors, this research seeks to provide a more comprehensive and nuanced perspective on the relationship between menstrual health and psychological well-being.

Δ Literature Review

An increasing number of studies have drawn attention to the psychological impact associated with menstrual disorders. Dysmenorrhea, characterized by painful cramps during menstruation, affects between 50% and 90% of menstruators and frequently interrupts their day-to-day activities (Iacovides et al., 2015). Research indicates that individuals experiencing severe dysmenorrhea tend to report elevated stress levels and face a higher likelihood of anxiety disorders (Chen et al., 2020). Similarly, premenstrual syndrome (PMS) which influences up to 75% of menstruating individuals is associated with mood fluctuations, irritability, and emotional turmoil (Direkvand-Moghadam et al., 2014). Premenstrual dysphoric disorder (PMDD), a more extreme variant of PMS is linked to profound anxiety and depressive symptoms and in some instances, thoughts of self-harm (Yonkers & Simoni, 2018). In addition to these issues, hormonal fluctuations throughout the menstrual cycle alter brain chemistry, affecting serotonin and cortisol levels which subsequently influence mood and anxiety (Almeida et al., 2019). The social stigma surrounding menstruation and inadequate access to menstrual health resources particularly in low- and middle-income nations further exacerbate mental health struggles (Sumpter & Torondel, 2013). Although awareness is increasing, there remains a significant need for more comprehensive, interdisciplinary research to better understand these relationships and develop effective mental health strategies (Collett et al., 2022).

Δ Research Problem

Although there is substantial evidence indicating a strong correlation between menstrual health and mental health issues, in-depth research investigating this relationship remains surprisingly scarce (Rapkin & Winer, 2009). Currently, healthcare systems tend to address reproductive health and mental health as distinct domains, overlooking the profound connections between them (Freeman, 2003). As a result of this disconnect, numerous individuals particularly adolescents and those from marginalized communities often lack the necessary support when facing psychological distress related to menstruation (Schoep et al., 2019). This paper intends to explore the interplay between menstrual health, stress, and anxiety, and to examine how a deeper understanding of these relationships may lead to enhanced health outcomes.

Δ Effect of Stress and Anxiety

Stress and anxiety are prevalent mental health concerns globally, with profound impacts on physiological and psychological functioning (Kessler et al., 2005). Chronic stress activates the hypothalamic-pituitary-adrenal (HPA) axis, resulting in elevated cortisol levels that disrupt hormonal balance, including those governing the menstrual cycle (Toufexis et al., 2014). Stress-related menstrual disturbances include delayed menstruation, amenorrhea, and exacerbation of pre-existing conditions like PMS (Nagma et al., 2015).

Moreover, stress and anxiety impair cognitive functions and quality of life, especially when compounded with menstrual discomfort (Bann et al., 2017). Adolescents and young adults are particularly vulnerable, as they often lack coping mechanisms and adequate knowledge of menstrual health (Omidvar et al., 2016). Studies also indicate that work-related stress among adult women is associated with increased menstrual irregularities and PMS symptoms (Wang et al., 2017). Stress not only worsens menstrual health but also creates a cyclical pattern of distress that compounds physical and emotional discomfort (Cousins et al., 2021).

Δ Association Between Menstrual Health and Stress

Menstrual disorders are both a cause and consequence of stress and anxiety, creating a complex, bidirectional relationship (Hantsoo & Epperson, 2015). The menstrual cycle involves fluctuating levels of estrogen and progesterone, which modulate brain regions implicated in emotion regulation, such as the amygdala and prefrontal cortex (Sundström-Poromaa & Gingnell, 2014). These hormonal changes contribute to increased vulnerability to anxiety, particularly during the

luteal phase of the menstrual cycle (Petersen et al., 2016). PMDD has been shown to significantly increase the risk of developing generalized anxiety disorder and major depression, especially in individuals with pre-existing vulnerabilities (Borenstein et al., 2003). On the other hand, psychological stress can influence gonadotropin-releasing hormone (GnRH) secretion, leading to ovulatory disturbances and amenorrhea (Berga & Loucks, 2005). A study by Nagma et al. (2015) found that 67% of medical students with high stress levels reported irregular menstrual cycles compared to only 20% with low stress levels. This suggests a strong psychosomatic link that warrants deeper investigation. Furthermore, stigma around menstruation leads to suppression of emotions and social withdrawal, contributing to feelings of isolation and anxiety (Johnston-Robledo & Chrisler, 2013).

Δ Discussion

The intersection of menstrual health and psychological stress involves a multifaceted interaction between biological, environmental, and social variables. Biological components include hormonal fluctuations, neuroendocrine responses, and genetic predispositions to anxiety and mood disorders (Epperson et al., 2012). Environmental factors encompass lifestyle choices, diet, sleep, and exposure to stressors such as academic pressure or socioeconomic hardship (Goyal et al., 2013). Social constructs, including cultural taboos and lack of menstrual education, further contribute to mental health outcomes (Mahon et al., 2015).

Interestingly, emerging research suggests mindfulness-based interventions and cognitive-behavioral therapy (CBT) as promising methods for managing menstrual-related psychological symptoms (Hunter et al., 2020). Physical activity and dietary changes also play a role in moderating the impact of PMS and anxiety (Pearson et al., 2017). Nonetheless, there remains a gap in targeted mental health services that incorporate menstrual health as a core component (Hall et al., 2022).

Δ Conclusion

Menstrual health is intricately linked with psychological stress and anxiety, with menstrual disorders both causing and exacerbating mental health challenges. Despite growing recognition of this connection, it remains an under-researched area in clinical psychology and gynecology. Understanding the bidirectional nature of this relationship is essential for designing holistic healthcare strategies that cater to both reproductive and mental health needs. Future research should adopt a multidisciplinary approach, integrating endocrinology, psychiatry, and public health to improve health outcomes for menstruating individuals globally.

References

1. Almeida, D. M., Davis, K. D., & Zahn-Waxler, C. (2019). Hormonal fluctuations and stress sensitivity across the menstrual cycle. *Journal of Affective Disorders,* 250, 228-234. https://doi.org/10.1016/j.jad.2019.03.004
2. Bann, C. M., Beyene, K. A., & Whitaker, K. M. (2017). Symptoms of anxiety and stress in relation to menstrual health. *Women's Health Issues,* 27(3), 279-285. https://doi.org/10.1016/j.whi.2017.01.005
3. Berga, S. L., & Loucks, T. L. (2005). Use of cognitive behavior therapy for functional hypothalamic amenorrhea. *Annals of the New York Academy of Sciences,* 1034(1), 147-157. https://doi.org/10.1196/annals.1335.015
4. Borenstein, J. E., Dean, B. B., & Yonkers, K. A. (2003). Evaluating the burden of premenstrual dysphoric disorder on work productivity and quality of life. *Journal of Women's Health,* 12(5), 455–462. https://doi.org/10.1089/154099903765448880
5. Chen, C. X., Draucker, C. B., & Carpenter, J. S. (2020). What women experience during dysmenorrhea: A qualitative study. *Journal of Midwifery & Women's Health,* 65(1), 103–109. https://doi.org/10.1111/jmwh.13048
6. Collett, C., Clare, T., & Yousafzai, A. (2022). Menstrual health, mental health, and the public health agenda. *The Lancet Public Health*, 7(5), e373. https://doi.org/10.1016/S2468-2667(22)00068-4
7. Cousins, L., Wing, L., & Denny, K. (2021). Menstrual distress, stress, and mental health among adolescents. *Adolescent Health, Medicine and Therapeutics*, 12, 119-130. https://doi.org/10.2147/AHMT.S295238
8. Direkvand-Moghadam, A., Sayehmiri, K., Delpisheh, A., & Kaikhavani, S. (2014). Epidemiology of premenstrual syndrome (PMS) - A systematic review and meta-analysis study. *Journal of Clinical and Diagnostic Research,* 8(2), 106–109. https://doi.org/10.7860/JCDR/2014/8024.4021
9. Epperson, C. N., Steiner, M., & Hartlage, S. A. (2012). Premenstrual dysphoric disorder: Evidence for a new category for DSM-5. *American Journal of Psychiatry*, 169(5), 465-475. https://doi.org/10.1176/appi.ajp.2011.11081302
10. Freeman, E. W. (2003). Premenstrual syndrome and premenstrual dysphoric disorder: Definitions and diagnosis. *Psychoneuroendocrinology*, 28, 25-37. https://doi.org/10.1016/S0306-4530(03)00099-8
11. Gulati, D., & Rahi, M. (2020). Understanding menstrual health from a public health perspective. *Indian Journal of Community Health*, 32(2), 293–297.

12. Hall, K. S., Kusunoki, Y., Gatny, H., & Barber, J. (2022). Stress and menstrual health: A longitudinal study. *Contraception,* 106, 53–59. https://doi.org/10.1016/j.contraception.2022.02.001
13. Hantsoo, L., & Epperson, C. N. (2015). Premenstrual dysphoric disorder: Epidemiology and treatment. *Current Psychiatry Reports,* 17, 87. https://doi.org/10.1007/s11920-015-0628-3
14. Hunter, M. S., Ussher, J. M., & Cariss, M. C. (2020). Psychological therapies for premenstrual disorders. *Cochrane Database of Systematic Reviews,* 2020(4). https://doi.org/10.1002/14651858.CD001396
15. Iacovides, S., Avidon, I., & Baker, F. C. (2015). *Dysmenorrhea and pain management: A review. Pain Management,* 5(4), 277–295. https://doi.org/10.2217/pmt.15.19
16. Johnston-Robledo, I., & Chrisler, J. C. (2013). The menstrual mark: Menstruation as social stigma. *Sex Roles,* 68, 9–18. https://doi.org/10.1007/s11199-011-0052-z
17. Kessler, R. C., Berglund, P., Demler, O., Jin, R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders. *Archives of General Psychiatry,* 62(6), 593-602. https://doi.org/10.1001/archpsyc.62.6.593
18. Mahon, T., Cavill, S., & House, S. (2015). Menstrual hygiene matters: A resource for improving menstrual hygiene around the world. *WaterAid,* 1–348.
19. Nagma, S., Kapoor, G., Bharti, R., Batra, A., Batra, A., & Aggarwal, A. (2015). To evaluate the effect of perceived stress on menstrual function. *Journal of Clinical and Diagnostic Research*, 9(3), QC01–QC03. https://doi.org/10.7860/JCDR/2015/11162.5669
20. Omidvar, S., Bakouei, F., Amiri, F. N., & Begum, K. (2016). Menstrual pattern among undergraduate students in South India. J*ournal of Natural Science, Biology and Medicine,* 7(2), 162–165. https://doi.org/10.4103/0976-9668.184697
21. Osman, M., Abbas, A. M., Ali, M. A., & Mohamed, O. M. (2021). Impact of menstrual disorders on academic performance among medical students. *Journal of Obstetrics and Gynaecology Research*, 47(2), 693–699. https://doi.org/10.1111/jog.14578
22. Pearson, R. M., Evans, J., & Kounali, D. (2017). Physical activity, diet, and psychological symptoms in menstruating women. *Journal of Affective Disorders,* 219, 139–146. https://doi.org/10.1016/j.jad.2017.04.043
23. Petersen, N., Cahill, L., & Baker, F. C. (2016). Hormones and mood across the menstrual cycle. *Nature Reviews Endocrinology,* 12, 636–646. https://doi.org/10.1038/nrendo.2016.110