ACHSM Asia-Pacific Journal of Health Management

CONFAB 360 DEGREE 2025

WEARABLES IN HEALTHCARE: A STUDY OF PATIENT PERCEPTIONS, USAGE, AND BARRIERS TO EFFECTIVE INTEGRATION

Ranpreet Kaur[1], Sonali Khurjekar[2], Sanmath Shetty[2], Gopa Das[2], Anuj Kumar[3]*

1. Bharati Vidyapeeth (Deemed to be University) Institute of Management & Entrepreneurship Development, Pune, India
2. Deccan Education Society - Institute of Management Development and Research, Pune, India
3. Faculty of Management Studies, Marwadi University Research Centre, Marwadi University, Rajkot, Gujarat, India

Correspondence: sonaleek9@gmail.com

ABSTRACT

Wearable devices are transforming the healthcare sector by facilitating continuous health monitoring, promoting proactive patient management, and enhancing overall health outcomes. From basic fitness bands to sophisticated health sensors, these devices gather real-time data on vital signs, physical activity, and other physiological metrics, providing crucial insights for both patients and medical professionals. Despite the growing adoption of wearables, there remains a need to understand user perceptions, actual usage patterns, and challenges. Such insights can help bridge gaps in healthcare delivery and improve patient outcomes, for various patient groups.

This study investigates patients' perceptions, usage behaviour, and the perceived limitations of wearable health technologies through a structured survey.

Findings indicate that while awareness and adoption levels are relatively high, a significant proportion of users remain sceptical about the effectiveness of wearables for long-term health monitoring. The most valued benefits cited by respondents are physical activity tracking, sleep monitoring, and stress tracking. However, key challenges include concerns over data privacy and accuracy, lack of seamless integration with formal healthcare systems, limited digital literacy, accessibility issues, high costs, and inadequate battery performance.

The findings highlight a critical gap between adoption and trust in wearable health technologies, underscoring the need for improved reliability, data privacy, user education, and healthcare integration to enhance patient confidence and outcomes. Overcoming these challenges is key to unlocking the full benefits of wearables in delivering accessible and effective healthcare.

KEYWORDS

data security and privacy, healthcare integration, Health Belief Model (HBM) Patient Empowerment, user adoption, wearable devices

INTRODUCTION

India's healthcare sector has witnessed tremendous growth in the past few years attracting substantial investments amounting to Rs. 2,61,900 crore (US$ 30 billion) between 2022 and 2024. The foreign direct investment (FDI) in healthcare and diagnostics has reached Rs. 27,140 crores ($3.27 billion USD) [1]. Increased demand for quality healthcare, deep insurance penetration and post pandemic resilience have contributed to remodelling this industry.

Despite this promising future, the healthcare sector in India sector faces several challenges. The biggest challenge is the urban-rural bed disparity. While 60% beds are available in metropolitan cities, 70% of Indian population resides in rural areas. According to a report on the state of healthcare in India [2] rural areas face a critical shortage of trained healthcare staff, resulting in limited diagnostic services. The report highlights that 73% of households with elderly members require constant care. Doctor vacancies in Primary Healthcare Centres (PHCs) are alarmingly high, with Chhattisgarh at 71%, followed by West Bengal (44%), Maharashtra (37%), and Uttar Pradesh (36%). India's doctor-patient ratio stands at about 1:1456, below the WHO's recommended 1:1000. Additionally, government health spending is low—around 1.28% of GDP—with rural health infrastructure receiving only a small portion, leading to underfunded facilities.

A report on Statista [3] shows that healthcare professionals are concentrated more in cities due to better career progression opportunities and pay scale. India is among the 57 countries facing a shortage of human resources for health. Against the WHO's recommended standard of 44.5 doctors, nurses, and midwives per 10,000 people, India's current density stands at 20.6. This marks a notable rise from 13.6 per 10,000 in 2005 [4]. This shortage causes delays in diagnosis and treatment, leading to long patient wait times. Rising lifestyle diseases and road accidents have increased emergency care demand, overcrowding tertiary hospitals and emergency departments, which compromises care quality and increases risks [5].

Another challenge is access to healthcare facility. Rural India has limited access to Primary Health Centres (PHCs) and Community Health Centres (CHCs), forcing many to rely on unregistered private practitioners. Rural populations often bypass primary care facilities due to low trust in public healthcare, overcrowding higher-level hospitals [6]. Additionally, high treatment costs pose a challenge, despite government health insurance schemes aimed at improving access to care [7]. High workload in the medical field leads to poor performance, increased errors, medical negligence and discharge against medical advice resulting from overworked healthcare professionals [8].

Even in developed cities, healthcare systems often face significant challenges such as overcrowded hospitals, long wait times, and staff shortages. Despite advanced infrastructure, unequal access to care and high treatment costs affects many patients. Additionally, gaps in digital health adoption and administrative inefficiencies reduce overall effectiveness. Given these critical gaps, India urgently needs a shift toward patient-empowered, preventive, and technology-driven healthcare. One of the most promising solutions lies in the integration of Artificial Intelligence (AI) and the fast-evolving wearable technology which is expected to bring a paradigm shift in the healthcare sector. AI-driven predictive analytics and remote healthcare solutions can improve diagnosis accuracy and help address disparities. Healthcare practitioners can adopt AI for patient monitoring, treatment planning, and administrative efficiency [9].

When incorporated into wearable devices, AI-powered wearables enable continuous, real-time health monitoring and early detection of complications—crucial for chronic disease management and preventive care [10]. Guo & Li [11] have confirmed that unobtrusive sensors effectively track heart rate, blood pressure, and oxygen levels to detect health deterioration. Wearable devices that track health signs like heart rate, blood pressure, blood sugar, and even heart rhythms (ECG) have shown to improve the management of long-term conditions such as heart disease and diabetes. Some advanced wearables use smart sensors and artificial intelligence to detect serious issues like irregular heartbeats with up to 95% accuracy [12].

Wearable devices empower patients by promoting engagement in their own health and ensuring better adherence to treatment plans, ultimately improving clinical outcomes. The integration of wearable technology into healthcare systems fosters precision and efficiency in clinical decision-making. By continuously tracking vital parameters like heart rate, blood glucose levels, and blood pressure, healthcare providers can develop personalized therapeutic strategies for conditions such as diabetes, hypertension, and cardiovascular diseases.

While wearable technology offers promising benefits, key challenges such as data privacy, system compatibility, and user acceptance continue to hinder its full integration into mainstream healthcare. Addressing these concerns is essential to realizing the true potential of wearables in supporting accessible and efficient care. Wearable technology, if implemented thoughtfully, has the potential to bridge gaps in access, enable early interventions, and empower patients.

THEORETICAL FRAMEWORK:

To better understand user adoption and engagement with wearable health devices, this study draws on the Health Belief Model (HBM), developed by social psychologists *Irwin M. Rosenstock, Godfrey M. Hochbaum, S. Stephen Kegeles, and Howard Leventhal* (1950) [13]. The HBM model suggests that an individual's decision to engage in a health behavior (e.g. using wearable health devices) is influenced by six key constructs: 1) Perceived susceptibility (e.g. risk of complications from uncontrolled diabetes or hypertension) 2) Perceived severity (e.g. fear of heart attacks or long-term disability) 3) Perceived benefits (when patients believe that wearables can improve health outcomes, they are more likely to accept and use the technology) 4) Perceived barriers like cost, data privacy, device complexity, or lack of awareness may hinder adoption 5) Cues to Action (may include physician recommendations, a recent health scare, peer influence, or exposure to promotional campaigns highlighting the benefits of wearable tech.) 6) Self-Efficacy (patients who feel confident in using wearable technology are more likely to engage with these devices consistently).

This study investigates whether wearable technology can serve as a feasible and scalable solution for improving chronic disease management and in reducing the burden on India's conventional healthcare systems. Prior research indicates that despite potential benefits, patients often show reluctance due to usability challenges, cost and data privacy issues [14]. It further explores barriers to adoption and patient experiences to understand its practical role in preventive healthcare.

However, ensuring equitable access and sustainable implementation will require collaborative efforts from policymakers, healthcare providers, technology developers, and end users alike.

LITERATURE REVIEW:

In India, low public healthcare spending and minimal insurance push millions into poverty due to medical expenses, disproportionately impacting marginalized groups. This study reveals high out-of-pocket expenses, especially in private healthcare, with low Epidemiological Transition Level (ETL) states facing greater financial distress, emphasizing the need for targeted health reforms [15]. Government healthcare spending remains low at 0.9% of GDP [16], which rose to 1.84 % in 2021-2022 [17] leading to high out-of-pocket expenses, pushing many into poverty. Poor sanitation and polluted water contribute to widespread health issues, while inadequate staffing and absenteeism further weaken healthcare delivery. Strengthening infrastructure, increasing skilled workforce, and community participation are essential for effective rural healthcare reforms [5]. Densely populated urban slums contribute to faster disease spread, raising hospitalization demands. Rural areas struggle with insufficient healthcare facilities, including a shortage of hospitals and beds. Moreover, despite government health insurance initiatives designed to enhance access, high treatment costs remain a significant barrier [18]. Research by Kesarwani & Garg [19] highlights several key factors contributing to burnout among Indian doctors. Prolonged working hours, professional dissatisfaction, and perceived stress are major causes. Low remuneration, insufficient time for leisure activities, and disturbed sleep patterns further elevate the risk. Additionally, a lack of respect in the workplace has been identified as a significant factor impacting doctors' mental well-being. Existing literature by Player

[20] highlights the challenges faced by rural population in accessing the healthcare facilities. The public healthcare funding is spent on urban settings while the private healthcare setups operate in cities leaving rural communities underserved. Shortage of trained healthcare providers often forces the rural population to rely on unqualified local providers or travel up to 100 kms for proper care.

India has integrated technology into healthcare through initiatives like the National Medical College Network and National Rural Telemedicine Network, improving e-health services. Enhanced broadband connectivity has expanded telehealth, addressing gaps from population growth and workforce shortages. Wider telemedicine adoption can improve public health, elderly care, and pandemic preparedness [21]. A study by Md Faiyazuddin [22] highlights AI's role in enhancing healthcare in India by improving diagnosis, treatment personalization, and resource management. AI solutions can address healthcare gaps, particularly in low-resource areas. However, collaboration among stakeholders is essential for ethical and equitable AI integration. The study by Kacker [23] found that 47.7% of adults surveyed in an urban Indian IT sector setting used health promotion-oriented smart devices, primarily smartwatches, with 55% using them daily to track physical activity. Key barriers to wider adoption included concerns about data reliability (53.8%), cost (37.2%), and privacy (21.8%). Another study by Ferguson & Davidson [24] highlights key barriers and facilitators affecting the acceptance of wearable devices among older adults, patients, caregivers, and healthcare professionals. Some of the reasons for reluctance are - concerns about device design, usability, affordability, and lack of timely feedback.

OBJECTIVES OF THE STUDY:

- To assess awareness and adoption of wearable devices for chronic disease management.
- To identify patient perceptions and barriers to wearable health technology.
- To recommend strategies for effective integration of wearables into healthcare systems.

RESEARCH METHODOLOGY

To assess the effectiveness of wearable technology in addressing healthcare disparities, a quantitative research approach was adopted. A structured questionnaire was designed to collect data on patient awareness, usage, perceived benefits, and barriers related to wearable health devices. Primary data was collected from the Pune region in Maharashtra. As there is no specific database providing an exact count of patients in the area, the population was considered infinite. Using Cochran's formula for an infinite population, a minimum sample size of 384 was determined [25]. A total of 435 questionnaires were distributed to respondents visiting in hospitals located in Kothrud, Pune, out of which 421 were returned. After excluding 11 incomplete responses, the final sample size for analysis was 410. Secondary data was sourced from various credible materials including research papers, academic journals, articles, newspapers, and verified online platforms to support the study and provide contextual background.

RESEARCH DESIGN

This study adopts a quantitative research design to examine awareness, adoption, perceptions, and barriers related to wearable health technologies among patients with chronic diseases in India. A structured survey was used to gather numerical data that can be statistically analysed to identify patterns and relationships. Patients diagnosed with chronic diseases such as diabetes, hypertension, and cardiovascular conditions, residing in both urban and rural areas in Pune, Maharashtra, India is considered as research population. Researchers have considered an infinite population as there is no database to provide exact number of patients in Pune, Maharashtra region, India. Snowball sampling method is used for collection of data. Based on Cochran's formula for an infinite population, a minimum sample size of 384 was determined, researchers collected data from the 410 patients for more inclusiveness [25].

DATA COLLECTION METHODS

A structured questionnaire was designed based on the Health Belief Model (HBM). The questionnaire was administered in person or digitally, depending on participant's accessibility and preference.

Ethical Considerations

- Informed consent was obtained from all participants prior to data collection.

- Anonymity and confidentiality of participants were strictly maintained.

PRIMARY DATA ANALYSIS

To ensure reliability, Cronbach's alpha was calculated, and content validity assessments were conducted to confirm the questionnaire's validity. The questionnaire was developed by identifying key variables through a review of existing literature, an analysis of secondary data and with unstructured discussion with patients.

TABLE NO 1: CASE PROCESSING SUMMARY

		N	%
Cases	Valid	410	100.0
	Excluded[a]	0	.0
	Total	410	100.0

[a]. Listwise deletion based on all variables in the procedure.

TABLE NO 2: RELIABILITY STATISTICS

Cronbach's Alpha	N of Items
.834	19

A reliability test was performed using Cronbach's alpha based on the internal consistency method. The computed Cronbach's alpha value was 0.834, with a standardized items alpha of 0.834. Since Cronbach's alpha value above 0.70 is deemed acceptable [26], it confirms that the data collected through the questionnaire is reliable. To validate the content, the drafted questionnaire was reviewed by six experts. Additionally, reliability and validity tests were conducted to ensure their appropriateness.

DEMOGRAPHIC PROFILE-

TABLE NO 3: DEMOGRAPHIC PROFILE

Gender	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Male	226	55.1	55.1	55.1
Female	184	44.9	44.9	100.0
Region				
Rural	25	6.1	6.1	6.1
Semi Urban	70	17.1	17.1	23.2
Urban	315	76.8	76.8	100.0
Family Annual Income				
Less than 8 Lac	209	51.0	51.0	51.0
8L-16 L	126	30.7	30.7	81.7
16 L-24 L	51	12.4	12.4	94.1
24 L and above	24	5.9	5.9	100.0
Age				
60 and above	17	4.1	4.1	4.1
45-60	257	62.7	62.7	62.7
30 -45	136	33.2	33.2	100.0

- Among the respondents, 226 patients (55.1%) identified as male, while 184 individuals (44.9%) identified as female.
- The majority of the respondents' patients (315) reside in urban areas, whereas 70 respondents are from semi-urban localities, and 25 respondents are from rural regions.
- A significant portion of the respondents' patients (51%) fall into the income bracket of less than 8 lakhs annually, while 126 patients belong to the income range of 8 to 16 lakhs.
- The majority, comprising 257 of the respondents' patients, fall within the 45–60 age group, followed by 136 patients in the 30–45 age group, and the remaining 17 patients belong to the 60 and above age group.

TABLE NO 4: AWARENESS FOR WEARABLE DEVICES AND IT'S ALL FEATURES

Awareness for wearable devices	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
1 (No)	20	4.9	4.9	4.9
2(Yes)	390	95.1	95.1	100.0
Awareness about all features of the device	**Frequency**	**Percent (%)**	**Valid Percent (%)**	**Cumulative Percent (%)**
1 (No)	342	83.41	83.41	83.41
2(Yes)	68	16.59	16.59	100.0
Adoption and usage	**Frequency**	**Percent (%)**	**Valid Percent (%)**	**Cumulative Percent (%)**
1(No)	25	6.1	6.1	6.1
2 (Yes)	385	93.9	93.9	100.0

- Among all respondents, 390 patients (95.1%) reported awareness of wearable devices, while 20 individuals (4.9%) indicated a lack of awareness.
- 83.41 % of the respondents are not aware of complete features of their device whereas only 16.58 % of them are aware of all the features.
- Out of the total respondents, 385 patients have adopted and are currently using wearable devices, whereas 25 patients have not adopted or are not using them.

TABLE NO 5: RESPONSES TO HEALTH BELIEF MODEL (HBM) CONSTRUCTS

HBM Construct	Response Level	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Perceived Susceptibility	Low (1)	280	68.3	68.3	68.3
	High (2)	130	31.7	31.7	100
Perceived Severity	Low (1)	290	70.7	70.7	70.7
	High (2)	120	29.3	29.3	100
Perceived Benefits	Low (1)	270	65.9	65.9	65.9
	High (2)	140	34.1	34.1	100
Perceived Barriers	Low (1)	120	29.3	29.3	29.3

	High (2)	290	70.7	70.7	100
Cues to Action	Low (1)	110	26.8	26.8	26.8
	High (2)	300	73.2	73.2	100
Self-Efficacy	Low (1)	275	67.1	67.1	67.1
	High (2)	135	32.9	32.9	100

- Perceived Barriers were reported as high by 70.7% of respondents, indicating that concerns such as cost, data privacy, or device complexity are significant challenges to the adoption of wearable technology.
- Cues to Action were also rated high by 73.2%, suggesting that physician recommendations, recent health scares, or peer influences are strong motivators driving patients toward wearable tech adoption.

In contrast, the following constructs were rated low by most participants:

- Perceived Susceptibility (68.3% low): Many patients do not feel at immediate risk from unmanaged chronic conditions like diabetes or hypertension.
- Perceived Severity (70.7% low): Patients may not fully grasp the seriousness of complications that could arise from untreated conditions.
- Perceived Benefits (65.9% low): A relatively small portion of the population perceives significant health advantages from using wearable devices.
- Self-Efficacy (67.1% low): Many patients lack confidence in their ability to effectively use wearable health technologies.

HYPOTHESIS

Ho: Patients using wearable devices do not believe that wearable devices are effective for health monitoring.
H1: Patients using wearable devices believe that wearable devices are effective for health monitoring.

TABLE NO 6: CASE PROCESSING SUMMARY

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Current using * perceived benefits	410	100.0%	0	.0%	410	100.0%

TABLE NO 7: CURRENT USING * PERCEIVED BENEFITS CROSS TABULATION

		Perceived benefits					Total
		1	2	3	4	5	
Current using	1	7	8	0	3	2	20
	2	131	133	32	57	37	390
Total		138	141	32	60	39	410

TABLE NO 8: CHI-SQUARE TESTS

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.852[a]	4	.763
Likelihood Ratio	3.402	4	.493
Linear-by-Linear Association	.058	1	.810
N of Valid Cases	410		

Since the p-value (0.763) is much greater than 0.05, so it is observed that, researchers fail to reject the null hypothesis [27]. There is no statistically significant association between patients using wearable devices and their belief in the effectiveness of these devices for health monitoring. Patients do not feel using wearable devices are effective for health monitoring.

TABLE NO 9: BARRIERS FOR NOT CONSIDERING WEARABLE DEVICES EFFECTIVE-

Barriers For Not Considering Wearable Devices Effective	Frequency	Percentages %
Data Accuracy and Reliability	345	84.15
Data Privacy and Security	369	90
Accessibility	214	52.2
User Awareness and Participation	164	40
Battery Life and Maintenance	174	42.4
Cost and affordability	185	45.1
Ease of Use & Digital Literacy	215	52.4
Compatibility with healthcare systems	227	55.4
Lack of Standardization	205	50
Unclear health benefits	369	90

The primary barriers patients do not consider wearable devices effective include concerns about data privacy and unclear health benefits (both at 90%), followed closely by data accuracy issues (84.15%). Other notable challenges are poor compatibility with healthcare systems (55.4%), digital literacy barriers (52.4%), and accessibility (52.20%). Cost, battery life, and lack of standardization also contribute to the skepticism.

TABLE NO 10: PERCEIVED BENEFITS OF WEARABLE DEVICES

Perceived benefits of Wearable devices	Frequency	Percentages %
Heart Rate Tracking	140	34.15
Physical Activity Tracking	271	66.10
Blood Oxygen Monitoring	91	22.20
Sleep Tracking	214	52.20
Stress Monitoring	181	44.15
ECG & Blood Pressure Monitoring	107	26.10
Fall Detection & Emergency Alerts	16	3.90
Blood Glucose monitoring	58	14.15

Table 10 shows that among patient respondents, the most commonly perceived benefit of wearable devices is physical activity tracking (66.10%), followed by sleep tracking (52.20%) and stress monitoring (44.15%). Heart rate tracking (34.15%) and ECG & blood pressure monitoring (26.10%) are also notable benefits. Less commonly perceived benefits include blood oxygen monitoring (22.20%), blood glucose monitoring (14.15%), and fall detection/emergency alerts (3.90%).

KEY FINDINGS:

- The majority of patient respondents are male (55.1%), urban residents, and fall within the 45–60 age group. Over half have an annual income below 8 lakhs (c$USD9,078), indicating a middle-income, aging urban demographic.
- A vast majority of patient respondents (95.1%) are aware of wearable devices, and 94.1% have adopted and are currently using them. This indicates high awareness and adoption rates among the patient population.
- Although respondents are aware of and actively using wearable devices, they do not perceive them as effective tools for health monitoring.
- Despite being aware of and using wearable devices, respondents do not view them as effective for health monitoring. This view is influenced by concerns over data accuracy and privacy, poor integration with healthcare systems, limited digital literacy, and unclear health benefits.

- Patients primarily perceive wearable devices as useful for tracking physical activity, sleep, and stress. Less emphasis is placed on features like blood glucose monitoring and fall detection.
- Patients cite key reasons to accepting the effectiveness of wearable devices, including concerns about data privacy, uncertain health benefits, and issues with data accuracy. Other contributing factors are poor integration with healthcare systems, limited digital literacy, accessibility challenges, and practical issues such as cost and battery life.
- Analysis based on the Health Belief Model revealed that while most participants reported high perceived barriers (70.7%) and strong cues to action (73.2%), indicating concerns about cost and privacy but also external motivators such as physician recommendations, the majority exhibited low perceived susceptibility (68.3%), severity (70.7%), benefits (65.9%), and self-efficacy (67.1%).

RECOMMENDATIONS:

- Collaborate with healthcare professionals to validate wearable device readings and enhance sensor accuracy, ensuring alignment with medical standards.
- Provide transparent privacy policies and user controls over data sharing, while implementing robust encryption and secure storage to protect sensitive information.
- Expand awareness campaigns to promote wearables and its important features for health monitoring and chronic disease management, partnering with healthcare providers to increase medical acceptance.
- Introduce affordable pricing models, subsidies, or financing options to make wearable devices accessible to lower-income populations.
- Design user-friendly interfaces and offer digital literacy programs focused on elderly and less tech-savvy users to improve adoption and effective use.

CONCLUSION

Wearable devices are revolutionizing the healthcare industry by enabling continuous health monitoring, proactive patient care, and improved health outcomes. Research highlights a high level of awareness and adoption of wearable devices among patients, particularly urban, middle-income, and middle-aged individuals. While users appreciate benefits like activity, sleep, and stress tracking, their confidence in the devices' health monitoring capabilities is undermined by concerns over data privacy and accuracy. Additional obstacles include poor integration with healthcare systems, limited digital literacy, accessibility and affordability issues, and practical concerns like battery life and standardization. These findings reveal disconnect between usage and trust—underscoring the urgent need for improved reliability, seamless healthcare integration, robust privacy protections, and supportive user education to truly realize the potential of wearable health technologies.

ACKNOWLEDGEMENTS:

The researchers would like to acknowledge the support by Dr Parimal Khurjekar, Anaesthesia practitioner in Pune for helping us reach the desired respondents. This helped us to collect data for the purpose of our research.

CONFLICTS OF INTEREST:

All the authors declare there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

ETHICAL APPROVAL:

The waiver of any requirements for an ethics committee consideration for this study was given by the Medwin Cares Hospital, Pune [LCBP-2022-00167] (16.08.2025) Appropriate consent was sought from the respondents before filling in the questionnaire. They were clearly told that the data collected will be purely used for the purpose of research and data privacy will be strictly maintained.

References

1. India GT. Healthcare clocked Rs. 2,61,900 crore (US$30 billion) investment in two years. New Delhi: IBEF. 2025.
2. Vision T. State of Healthcare in Rural India 2024. Delhi: Drishti Publications. 2024.
3. Statista. Healthcare in India - statistics & facts. India: A Minhas. 2024.
4. Vini Mehta, P. A. (2024). Human resource shortage in India's health sector: a scoping review of the current landscape. BMC Public Health, 1-13.
5. Tiwari Y, Goel S, Singh A. Arrival time pattern and waiting time distribution of patients in the emergency outpatient department of a tertiary level health care institution of North India. J Emerg Trauma Shock. 2014;160-5.
6. Singh SS, Bandyopadhyay S. Health care in rural India: A lack between need and feed. South Asian J Cancer. 2014;143-4.
7. Bandyopadhyay SN. Developing a Unique Model on Bed Per Doctor & Bed Per Nurse for Increased Patient Satisfaction in India Post Covid-19 Outbreak. Int J Adv Bus Manag Res. 2023;30-7.
8. Azhar GS, Azhar AZ, Azhar AS. Overwork Among Residents in India: A Medical Resident's Perspective. J Family Med Prim Care. 2012;141-3.
9. Neyigapula BS. AI in Healthcare: Enhancing Diagnosis, Treatment, and Healthcare Systems for a Smarter Future in India. Adv Bioeng Biomed Sci Res. 2023;6(10) 171-7.
10. Mattison G, Canfell O, Forrester DA, Dobbins C, Mattison GC. The Influence of Wearables on Health Care Outcomes in Chronic Disease: Systematic Review. J Med Internet Res. 2022.
11. Guo Y, Li X. A review of wearable and unobtrusive sensing technologies for chronic disease management. Comput Biol Med. 2021.
12. Voisin M, Y S. Ambulatory Atrial Fibrillation Monitoring Using Wearable Photoplethysmography with Deep Learning. Phys Med Biol. 2018.
13. Murphy TF. The Key to Health Choices: Demystifying the Health Belief Model. The Psychology Fanatic Newsletter. 2024 Jun 1.
14. Alzghaibi, H. (2025). Perspectives of people with diabetes on AI-integrated wearable devices: perceived benefits, barriers, and opportunities for self-management. Frontiers in Medicine, 1-14.
15. d JY. Health care utilization and expenditure inequities in India: Benefit incidence analysis. Clin Epidemiol Glob Health. 2022;1-10.
16. Sriram, S. (2018). Availability of infrastructure and manpower for primary health centers in a district in Andhra Pradesh, India. Journal of Family Medicine and Primary Care, 1256-1262.
17. Perappadan, B. S. (2024). India registers decline in out-of-pocket expenditure for health: report. New Delhi: The Hindu.
18. Bardosh KL, Jones S. Addressing vulnerability, building resilience: community-based adaptation to vector-borne diseases in the context of global change. PubMed. 2017.
19. Kesarwani V, Garg Z. Prevalence and Factors Associated with Burnout among Healthcare Professionals in India: A Systematic Review and Meta-Analysis. Indian J Psychol Med. 2020;108-15.
20. Player J. Healthcare Access in Rural Communities in India. Ballard Brief. 2019.
21. Maroju R, Chandana S. Role of Telemedicine and Digital Technology in Public Health in India: A Narrative Review. Cureus. 2023;1-8.
22. Md Faiyazuddin S. The Impact of Artificial Intelligence on Healthcare: A Comprehensive Review of Advancements in Diagnostics, Treatment, and Operational Efficiency. Health Sci Rep. 2025.
23. Kacker H. Association of the Self-Assessed Health, Lifestyle and Use of Health Promotion Oriented Smart Devices of Adults in India [dissertation]. Lithuania: Lithuanian University of Health Sciences. 2024.
24. Ferguson C, Davidson L. "Wearables only work on patients that wear them": Barriers and facilitators to the adoption of wearable cardiac monitoring technologies. Cardiovasc Digit Health J. 2021;137-47.
25. Johnson, C. Cochran's Sample Size Calculator. (2025, April 1). Retrieved from dissertation data analysis help: https://dissertationdataanalysishelp.com/cochrans-sample-size-calculator/
26. Cortina JM. What Is Coefficient Alpha? An Examination of Theory and Applications. J Appl Psychol. 1993;98-104.
27. Byjus. P-Value [Internet]. [cited 2025 Jul 14]. Available from: https://byjus.com/maths/p-value/