

SMART HEALTHCARE MANAGEMENT WITH AI TOOL FOR MUMBAI POLICE PERSONNEL**Ms. Mrugaya Sachin Gaikwad¹ and Dr. Sayali Yadav²**¹Ph.D. Scholar, R.A. Podar College of Commerce and Economics²Associate Professor, Guru Nanak Khalsa College of Arts, Science & Commerce**ABSTRACT**

Mumbai is a metropolitan city where every second matters and the responsibility to protect the city lies on public officers. This research studies the well-being of Mumbai police who have dedicated their life for this city. Well-being often comprises as physical and mental. The duties of Mumbai Police personnel expose them to irregular schedules, high-pressure situations and continuous public interaction all of which can affect their overall health and well-being. This study describes work pattern, duty hours, work related stress and preventive and precautionary measures along with willingness of Mumbai Police Personnel to use the mobile friendly AI application to balance their daily routine with physical and mental health.

The data is collected from both primary and secondary sources. Primary data was collected from 72 respondents through a structured questionnaire designed to capture health patterns, stress indicators and the willingness of police personnel to adopt technology-based health solutions. Secondary data from books, research papers, policy documents and credible news reports supports the analysis. The study uses descriptive and analytical methods, applying statistical tests such as correlation, Spearman's rank correlation and chi-square to interpret the findings.

The results show a clear link between occupational stress and physical health deterioration and nature of duty affecting the physical health problems such as back pain, leg pain, etc. also irregular eating habits creating gastric issues, diabetes, and weight imbalance. This establishes the scope for continuous health monitoring for frontline police staff. The responses indicate that many personnel experiences stress-related concerns and show interest in simple, easy-to-use AI-based tools that can help them track their health or receive early alerts. While the study opens a practical discussion on 'technology can complement existing health systems and strengthen occupational well-being in the police force'. Overall, this research describes smart healthcare solutions to support Mumbai Police Personnel in maintaining better well-being in this technological era.

Keywords: Public officers, Mumbai Police, well-being, physical health, stress, technology based, AI based, etc.

INTRODUCTION

Mumbai is more than just a city; it is a living, breathing heartbeat of India and home to over 22 million people (World Population Review, 2025). It is also the nation's financial engine, filled with dreams, struggles, and the ceaseless pace of urban life. This environment exerts immense pressure on public services, particularly the Mumbai Police, which has a sanctioned strength of around 40,623 personnel. In a metropolis where every second matters, effective management of public resources and the well-being of the police personnel providing those services is critical.

The National Health Policy (NHP) 1983 marked a pivotal moment in India's healthcare journey representing the country's ambitious commitment to achieving 'Health for all by 2000'. Nevertheless by 2000 it was clear that many goals like anaemia reduction, access to essential drugs and reducing IMR and MMR were not met. However, by prioritizing primary healthcare, community participation and equitable access to medical services, the NHP 1983 laid the foundation for India's modern healthcare infrastructure. It was India's first real attempt to outline strong public health system and a created a robust foundation for NHP 2017 which suits a changing India especially by bringing digital health, wider health protection and better-quality standards. NHP 2017 focused on universal health coverage aiming for 2.5% of GDP spending on Ayushman Bharat, Ayushman Arogya Mandir, Ayushman Bharat Digital Mission and Mission Indradhanush.

In the context of Human Resource Management (HRM) employee well-being has evolved from a welfare-oriented concept to a strategic organisational priority. It is more than just the absence of physical illness. World Health Organisation (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. Recently many new dimensions like spiritual, emotional, vocational, etc have been identified. In an organisation setting, well-being is been mostly shaped by work environment. The Job Demands-Resources (JD-R) Model, propounded by Arnold B. Bakker and Evangelia Demerouti (2001) in HRM for assessing employee well-being. It categorizes work characteristics into job demands includes high pressure tasks such as heavy work hours, irregular shift patterns, physical risks, and emotional labour. and job resources such as social support, professional training and task autonomy. The Effort-

Recovery (E-R) Model, developed by Theo Meijman and Gijsbertus Mulder (1998), focuses on the physiological and psychological costs of work-related effort.

In today's fast-paced landscape of technology-enabled though Artificial Intelligence (AI), IoT, Advanced Machine Learning and mobile application has revolutionized the way healthcare services are delivered and monitored. This technological progression is particularly vital for the Mumbai Police, a force operating in a changing urban environment where changing duty cycles and emotional burdens often overshadow personal health needs.

For these protectors of the city, the integration of smart healthcare management is no longer an academic luxury but an urgent necessity. By utilizing AI-powered tools to monitor physiological stress and optimize recovery cycles, the force can transition from a reactive welfare approach to a proactive, dignity-centered system of care.

SCOPE OF STUDY

This study focuses on understanding the health and well-being of the Mumbai Police personnel, especially Constables and Head Constables who spend most of their working hours on the field. These frontline staff often deal with long duty hours, irregular shifts, large public gatherings, emergencies, bandobast, security and stressful situations. Because of this demanding nature of work, their physical and mental health needs regular attention and support. The study therefore concentrates on this group, as they represent the largest part of the force and face the highest workload.

The research is limited to the Mumbai Commissionerate area, keeping the study closely connected to the local working conditions, administrative structure and lifestyle patterns of Mumbai Police personnel. It looks at their present health concerns, the challenges they face in accessing timely healthcare and the level of stress experienced due to their daily duties. Within this framework, the study also tries to understand whether new AI-based health tools such as fitness trackers, digital health monitoring systems or stress-alert applications can offer practical support to them in their routine life.

The data for the study has been collected from 72 police personnel through structured questionnaires, along with information from books, research papers and reliable news sources.

In short, the scope of this research is to understand the current health realities of frontline police personnel and to understand that smart, technology-enabled healthcare solutions might support them in leading healthier and safer working lives.

REVIEW OF LITERATURE

Shankar, 2025 According to author in today's hospitals, human resources are no longer just about hiring and payroll they have become a strategic partner in patient care, especially when supported by smart healthcare management tools powered by AI. By using AI-driven systems, HR can streamline recruitment, monitor staff performance, design fair compensation, and improve retention, while also guiding cultural integration during mergers. These tools help managers make data-informed decisions, reduce bureaucracy, and keep the focus on patient outcomes. In a healthcare system like India's, where demand is rising and resources are stretched, AI-enabled HR practices can bridge gaps, ensure accountability and build a more resilient workforce that supports both quality care and sustainable public health.

Sandhya, 2025 stated that police officers worked long hours and faced high-pressure decisions, which made balancing their professional obligations and personal lives very difficult. Their job was demanding because they had to manage time carefully and endure stress, while also making split-second choices that affected many lives. The study examined social support influenced work-life balance and it found that job satisfaction and resilience acted as mediators. Data was collected from 242 gazetted officers across Karnataka, analyzed using structural equation modeling. The results showed that when officers received strong social support, they felt more satisfied with their jobs and therefore became more resilient. These two factors together contributed to better work-life balance. In other words, resilience and job satisfaction were the bridges between support and balance. Further argued that organizations could reduce workload by recruiting more officers in line with UN recommendations and they could improve well-being through peer support programs, mindfulness sessions as well as cognitive behavioral training. These steps were important since they strengthened both personal and professional health.

Kalid et al., 2024 proposed an e-healthcare management web-based platform for medial users to improve management efficiency. This initiative focuses on issues arising in healthcare organizations in Malaysia. The authors suggested that by using technology medial staff can make their work easier and faster which will save the time of doctors and nurses and reduces the cost as compared when doing things manually. Since the

healthcare sector keeps on changing and improving adapting to the new technology would be the suitable solution. This research has also integrated various modules, including medical user management, consultation, appointment, e-medication, etc which are beneficial for the patients and hospital management.

Al-Faouri et al., 2024 investigated the relationship between technology application and Smart Human Resource Management (SHRM). Using a quantitative research methodology, researchers have collected data from employees of telecommunications firms in Jordan. The researcher had tested the relationship between technology application and innovation performance and accepted technology adoption as strong relationship with work environments, organization culture, employee empowerment and creating value for stakeholders. Therefore, to foster the innovation and organizational success application of technology, SHRM and innovation performance plays the pivotal role.

Malhotra, 2024 stated that Police officers are often exposed to physical, biological and psychological hazards while at work. This repetitive exposure leads to occupational trauma which has caused to serious mental health problem and police officers mental health is critical public health issue. The researchers have extracted the data from 588 articles and 36 studies (1983-2022) and analysed the data using both qualitative and quantitative methods. Police officers cope with trauma through positive strategies such as problem solving, positive thinking, spirituality, stress management, peer support, etc. However, many of them uses negative strategies such as avoidance, substance use, emotional distancing, self-isolation, etc. The research leaves a scope for future efforts in align with United Nations Sustainable Development Goals by prioritising police mental health.

Kaushik, 2024 analysed the optimism and work life balance of police officers because police work is very demanding and through using surveys the research studied the factors which influence their job satisfaction, productivity and stress levels. The results revealed that more optimistic officers felt happier, less stressed and more satisfied in their jobs as compared to less optimistic one. The study also offered actionable insights for organizational policies, training initiatives, and interventions aimed at improving the well-being and effectiveness of police personnel.

Sharma, 2022 Healthcare systems implemented cutting-edge techniques to give sufferers with helpful and specialised treatment. Although the hospital care cost continued to increase, all have started saving money and time using internet services that resolves medical conditions. However, with implementation of Artificial Intelligence facilitator can operate for early diagnosis and treatment for patients with or without entry to clinics also there was going trend of assisting patients with immediate notification about seriousness of patient's condition especially for patients those who monitor current health status due to expert's analysis of the information supplied through Internet of Things (IoT). The research also suggests to enhance the system certain characteristics can be also included such as weight, age, gender, etc., mostly on diagnosis as well as therapy of cardiac disorders.

Bose, 2025 May 17 Times of India, A new health application has been Bhandara Police called Arogya. The application used artificial intelligence to monitor police officer's health. The information of officer's health records will be stored in the application and if an officer health at risks, then the application will give alert to the senior officials. In this application the facilities like online doctor consultation, tele-medicine services, etc were provided. According to Superintendent of Police Noorul Hasan explained that the application is useful especially for officers working in remote police stations.

RESEARCH GAPS

To study the research gaps thematic review of literature was conducted by the researcher. While doing review of literature the researcher has observed many studies are conducted on adoption of AI tool in medical hospitals for the maintaining patient's history, online medication and consulting, while generating patients reports for medical users. It was also noted some Police officers are often exposed to physical, biological and psychological hazards while at work and it recommends to enhance the system with certain characteristics which can be included such as weight, age, gender, etc., mostly on diagnosis as well as therapy of cardiac disorders for them through IoT. During review, it has been also observed that similar kind of AI application is developed by other district but still it is lacking in use and the rest parts of Maharashtra state also needs such kind of AI-technology enabled application to enhance the well-being of Mumbai Police Personnel.

OBJECTIVES OF RESEARCH

1. To understand the well-being Mumbai Police Personnel.
2. To study work patterns and duty hours and its impact on physical and Mental Health of Mumbai Police Personnel.

3. To explore support systems for smart healthcare management for Mumbai Police Personnel.

HYPOTHESIS OF RESEARCH**Hypothesis 1**

(H₀): There is no significant correlation between overall well-being, work pattern and duty hours of Mumbai Police Personnel.

(H₁): There is a significant correlation between overall well-being, work pattern and duty hours of Mumbai Police Personnel.

Hypothesis 2

(H₀): Mumbai Police personnel are not willing to use the AI-based health management application.

(H₁): Mumbai Police personnel are willing to use the AI-based health management application.

RESEARCH METHODOLOGY**Research Title: Smart Healthcare Management with AI tool for Mumbai Police Personnel.**

The study explores the practical effectiveness of smart healthcare tool to address the physical and psychological needs of Mumbai police personals. The study is based on Descriptive and Analytical research methods. Descriptive as it has described the health condition, work related stress factors, physical and mental well-being of Mumbai police personnel. Analytical as it analyzed relationship work pattern and its effects on physical and mental health.

The universe of research consists of Mumbai Police Personnels with the sample comprise of Mumbai Police Constables and Head Constables. Stratified and purposive sampling methods are used. Researcher first stratified the entire population rank wise, then used purposive sampling as Constables and Head Constables experience the highest physical and mental workload and the objective focuses on frontline personal well-being.

Since the total sanction post of Mumbai police is 40,623 personnel and the study focus on Mumbai Police Constables and Head Constables which is 70-75% of any police force in India. (Police administrative reports)

Estimated Police Constables and Head Constables

40,623*70% = 28,400 police personnel

Applying Slovin's Formula, $n= N/1+N(e^2)$

Where:

n = required sample size

N = population size (Constables + Head Constables \approx 28,400)

e = margin of error (10% commonly used)

However, in this we consider slightly higher margin of error that is 12%

CALCULATION

$n= N/1+N(e^2)$

$n= 28,400 / 1+28,400 (0.12^2)$

$n=28,400 / 1+28400 (0.0144)$

$n= 28,400 / 1+409$

$n=28400 / 410$

n= 69.2

So, the required sample size becomes 70 respondents and the researcher has used 72 as sample size for this research.

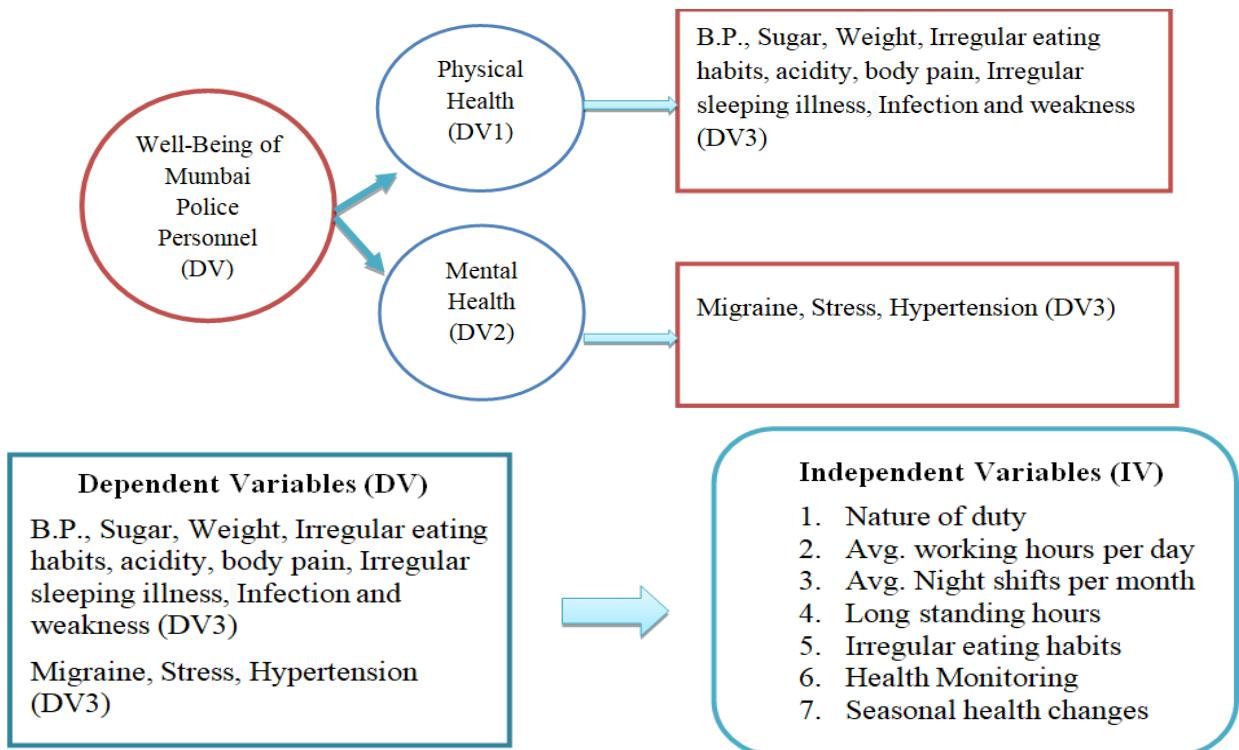
Sampling area is Mumbai. Both primary and secondary data collection methods are used to get the accurate information. Data is collected through 17 structured questions using a questionnaire method. Secondary information is collected from books, research papers, and newspapers. Correlation test, Spearman's rank correlation, and chi-square test are used for data analysis through Microsoft excel software.

CONCEPTUAL FRAMEWORK

1. List of Variables under study

Personal & Service Profile	Age, Gender, Year of Service, Position, etc
Work Pattern & work related	Nature of Duty, Avg. working hours and Avg. night shifts per month
Physical Health	B.P., Sugar, Weight, Irregular eating habits, acidity, body pain, Irregular sleeping illness, Infection and weakness
Mental Health	Migraine, Stress, Hypertension
Prevention and Precaution	Regular reminders for medical check-ups and fitness assessments and confidential counselling

2. Dependent and Independent Variables



DATA ANALYSIS AND INTERPRETATION

Objective 1: Stress, Mental Health & Physical Health

1. Work-related Stress Affecting Physical Health

Work-related stress affects my physical health	Percentage
Agree	58%
Disagree	3%
Neutral	7%
Strongly agree	31%
Strongly disagree	1%

Interpretation:

There exists a clear link between occupational stress and physical health deterioration.

2. Physical Discomfort Due to Long Standing Hours

Long standing hours cause physical discomfort	Percentage
Agree	65%
Disagree	7%
Neutral	4%
Strongly Disagree	1%
Strongly agree	22%

Interpretation:

Prolonged standing leads to back pain, leg pain, and fatigue, indicating ergonomic risks.

3. Irregular Eating Habits

Due to duty hours, my eating habits are irregular	Percentage
Agree	57%
Disagree	4%
Neutral	4%
Strongly agree	35%

Interpretation:

Irregular eating increases the risk of **gastric issues, diabetes, and weight imbalance**.

Objective 2: Work Pattern and Duty Hours Analysis

1. Nature of Duty

Nature of Duty	Percentage
Combination of field and desk duty (standing, sitting, and walking)	61%
Duty involving frequent change of posture throughout the day	8%
Mostly desk duty involving prolonged sitting	10%
Mostly field duty involving long hours of standing/walking	21%

Interpretation:

Most personnel perform physically demanding duties, increasing the risk of musculoskeletal problems and fatigue.

2. Average Working Hours per Day

Average Working Hours per Day	Percentage
11–12 hours	25%
9–10 hours	11%
More than 12 hours	58%
Up to 8 hours	6%

Interpretation:

A majority work more than 10 hours daily, exceeding standard work norms and increasing stress and health risks.

3. Night Shifts per Month

Average Night Shifts per Month	Percentage
1–5	35%
6–10	15%
More than 10	29%
None	21%

Interpretation:

Frequent night shifts disturb sleep cycles, contributing to mental fatigue and emotional stress.

Objective 3: Preventive & Seasonal Healthcare Needs

1. Regular Health Monitoring

Do you regularly monitor your BP, blood sugar, or weight?	Percentage
No	53%
Yes	47%

Interpretation:

A large section does not regularly monitor health indicators, highlighting the need for automated reminders.

2. Medical & Fitness Reminders

Would reminders for medical check-ups and fitness assessments help?	Percentage

No	6%
Yes	94%

Interpretation:

Personnel strongly support preventive healthcare alerts.

3. Seasonal Health Alerts

Seasonal health alerts (heat, monsoon, pollution) would be useful.	Percentage
No	10%
Yes	90%

Interpretation:

Seasonal alerts for heat stress, monsoon diseases, and pollution are considered highly beneficial.

Testing of Hypothesis**Hypothesis 1**

H₀: No significant correlation between well-being, work pattern, and duty hours

H₁: Significant correlation exists

Table: Spearman's Rank Correlation between Duty Hours and Overall Well-Being (Y)

Independent Variable	Spearman's ρ (Correlation with Y)	t-value	p-value
Average Working Hours per Day	0.257	2.229	0.029
Average Night Shifts per Month	0.095	0.802	0.424

Interpretation of Results

Average Working Hours per Day shows statistically significant weak positive correlation with overall well-being ($\rho = 0.257$, $p < 0.05$). The result suggests that duty duration plays an important role in influencing physical and mental health outcomes, even though the strength of the relationship is modest.

Average Night Shifts per Month statistically significant weak positive correlation with overall well-being ($\rho = 0.095$, $p < 0.05$). This implies that night shifts, when considered independently, do have a statistically significant association with overall well-being in the present study.

Hypothesis 2

H₀: Mumbai Police personnel are **not willing** to use the AI-based health management application.

H₁: Mumbai Police personnel are **willing** to use the AI-based health management application.

Willingness to Use AI Health App	Observation
Yes	68
No	4

For your Chi-Square Goodness-of-Fit test:

- $\chi^2 = 56.88$
- Degrees of freedom (df) = 1
- p-value: $p < 0.001$

Interpretation:

A Chi-Square Goodness-of-Fit test was conducted to examine the willingness of Mumbai Police personnel to use a secure AI-based health application. The results show a highly significant difference between observed and expected responses ($\chi^2 = 56.88$, $df = 1$, $p < 0.001$).

Out of 72 respondents, 68 expressed willingness to use the AI-based health app, while only 4 were unwilling, indicating overwhelming acceptance of the AI-based system.

Preferred AI Features (Ranking by Frequency)

Top-ranked features:

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1. Health monitoring dashboard
 2. BP, sugar & weight tracking
 3. Sleep & fatigue monitoring
 4. Stress alerts & emotional support
 5. Mental health counselling
 6. Seasonal health alerts
 7. Medical reminders
 8. Emergency health coordination

Key Findings Summary

1. Police personnel experience long duty hours, frequent night shifts, and high stress
2. Physical discomfort and irregular lifestyle are common
3. Preventive healthcare and mental health support are strongly needed
4. AI-based smart healthcare systems are highly acceptable and desirable

RECOMMENDATIONS

Based on the study the AI technology application should be enabled which should be equip with personalised health monitoring dashboard, BP, sugar & weight tracking, sleep & fatigue monitoring, stress alerts & emotional support, mental health counselling, seasonal health alerts, medical reminders, emergency health coordination, standing hours and sitting remainder and vice-versa, etc.

To strengthen the Police health personnel the application of Public Private Partnership (PPP) can be the solution as it will bridge the gap through arrangement of AI-based healthcare technology application with continuous upgradation, maintenance and expert monitoring. Private companies can shake hands with government through PPP model through which Police officers will receive timely health support, stress management solutions and user-friendly tools.

CONCLUSION

The present research study focuses on the well-being their work patterns, duty hours and its impact on physical and Mental Health and it has also explored the support systems for smart healthcare management for Mumbai Police Personnel.

Through this, it becomes evident that Mumbai Police carry demanding responsibilities which affects their physical and mental well-being. Mumbai Police Personnel experiences work related stress because of nature of duty, long working hours, night shifts, long standing hours, irregular eating habits, etc. Therefore, to address these challenges AI enabled healthcare application can play a promising role. The data also revealed the willingness of Mumbai police to use such AI technology enabled application.

In essence, the integration of AI-enabled healthcare supported can be through a thoughtful Public-Private Partnership (PPP) model which will offers a powerful pathway to strengthen the well-being of Mumbai Police personnel. By combining technological intelligence with professional healthcare expertise, PPPs can ensure continuous monitoring, preventive care, and timely interventions, benefits that directly support the physical and emotional resilience of the force. When police personnel are healthier, less stressed and better supported, their capacity to serve the public improves significantly. Therefore, investing in smart healthcare for the police is not just an institutional priority but a broader social commitment. A healthier police force ultimately contributes to a safer, more efficient and compassionate city one where the well-being of those who protect us becomes a foundation for the well-being of all.

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