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Leveraging health data analysis to improve expatriate health outcomes: An Indian expatriate perspective in the middle east

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Abstract

Health data analytics, which is the methodical application of information from wearable technology, insurance claims, medical records, and other sources to produce actionable health insights, enables the provision of preventive, predictive, and individualised healthcare services. In addition to facilitating chronic disease management and public health surveillance catered to expatriate demographics, this data-centric approach supports optimal healthcare navigation for expatriates, who frequently encounter bureaucratic obstacles and lack familiarity with foreign healthcare systems.

Using health data is very important for Indian expatriates. Changes in lifestyle brought on by migration, disparities in access to healthcare, and the treatment of chronic illnesses are complicated problems that need for sophisticated frameworks for healthcare delivery. In addition to enabling early risk assessment and individualised treatment plans, data analytics is also used in larger population health programs in the Middle East that incorporate health data from expats in order to identify new trends and allocate resources as efficiently as possible.

Hence a study regarding the expatriate healthcare and data analytics, giving prime importance to the leverage it creates was taken into consideration. The research has provided with such delighted and farreaching impacts and foresights to the future.

Keywords: Health data analytics, expatriate healthcare, preventive healthcare

Introduction

Indian expatriates around the world, especially in the Middle East, confront distinct healthcare issues because of environmental conditions, lifestyle changes brought on by migration, and restricted access to well-known healthcare ecosystems. As more than 8.5 million Indians live in the Gulf Cooperation Council (GCC), it is becoming more and more important for public health to make sure that they have the best possible health outcomes (Bashir, 2024) ^[6]. Because chronic illnesses including diabetes, high blood pressure, and heart problems are common in the Indian diaspora, healthcare strategies must be customised to the sociocultural and geographic circumstances of expatriates (Taipalus, 2022) ^[7].

Health data analysis offers transformative potential in addressing these challenges by leveraging extensive datasets-ranging from electronic health records to real-time biometric monitoring-to derive actionable health insights. Descriptive, predictive, and prescriptive analytics enable healthcare providers to develop personalized prevention and treatment plans, facilitate efficient healthcare navigation, and optimize resource allocation (Tandon *et al.*, 2025) ^[8]. Despite the growing body of research on healthcare data analytics, there is a gap in literature focusing specifically on its application to expatriate populations, notably Indian NRIs in the Middle East.

This study aims to bridge this gap by examining how health data analytics enhance personalized care, improve chronic disease management, and support smoother healthcare access for Indian expatriates in Middle Eastern countries. The central hypothesis is that data-driven healthcare interventions can significantly improve health outcomes and quality of life for this population. Through systematic literature synthesis and real-world case examples, this research will demonstrate the multifaceted role of data analysis as a critical enabler of expatriate healthcare optimization.

Objectives of the Study

1. To examine the role of health data analytics in providing personalized and preventive healthcare services to Indian expatriates residing in Middle Eastern countries.
2. To assess the utility of aggregated health data in public health surveillance and resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.

Literature Review

Scholarly interest in the health and wellbeing of Indian expatriates in the Middle East has grown, particularly given the region's significant reliance on foreign workers in a variety of industries, including healthcare. Numerous researches have examined the healthcare, socioeconomic, and demographic issues this community faces as well as the ways in which health data analytics might help to address these issues.

Demographic and Health Challenges of Indian Expatriates

The demographics and health status of uninsured expatriate workers in Saudi Arabia were examined in a seminal study by Alkhamis and Miraj (2016) ^[9], which also noted the significant percentage of Indian workers in this group. The study highlighted how the health status and access to healthcare services of expatriates are correlated with demographic parameters such as age, educational attainment, nationality, and language competence. This supports study by Bashir (2024) ^[6], who conducted qualitative research in Qatar and found that language limitations, bureaucratic hold-ups, and cultural integration problems are among the major obstacles faced by foreign healthcare workers. These obstacles have an impact on the quality and accessibility of healthcare for Indian expats, highlighting the urgent need for specialised support systems and health treatments.

For Indian expatriates, mental health is yet another crucial area of worry. According to Khan *et al.* (2023) ^[2], social isolation and familial separation are major causes of the high prevalence of anxiety, depression, loneliness, and sleep problems among Indian migrant workers in the United Arab Emirates. Further highlighting the problem of health literacy in the United Arab Emirates, Nair *et al.* (2022) ^[11] found that a sizable portion of the patient population, including expatriates, lacks adequate health literacy, which has a negative impact on health outcomes, especially for chronic diseases like diabetes and cardiovascular disease that are common in Indians. Together, these studies show how complicated sociocultural and psychosocial factors affect Middle Eastern expatriate health.

Application of Health Data Analytics in Expatriate Healthcare

There is growing recognition of the potential of health data analytics to tackle these issues. Data analytics is the methodical application of information from wearable technology, insurance claims, electronic medical records, and other health-related platforms to produce useful insights for the provision of healthcare. By combining various data streams and using machine learning techniques to forecast health decline and optimise treatment approaches, big data analytics can enhance illness management and preventive care, claim Batko and Ślęzak (2022) ^[12].

Challenges in Data Utilization and Ethical Perspectives

The best application of health data analytics for managing the health of expatriates is hampered by a number of issues, despite its potential. Tandon *et al.* (2025) ^[8] talked about topics such algorithmic biases that could disproportionately impact vulnerable groups and ethnic minorities, data privacy problems, and data interoperability across nations. It is emphasised that in order to optimise benefits while maintaining ethical standards, strong regulatory frameworks and healthcare providers' ability to interpret analytical results are essential.

Research Gap and Need for Focused Studies

Although these studies highlight the potential of health data analytics and the health issues faced by expats, there is still a dearth of research on Indian expatriates in the Middle East and how they employ datadriven healthcare solutions. The majority of current research either covers healthcare data analytics in domestic populations or focusses on expatriate populations in general without breaking them down by nationality. In order to close this gap, new multidisciplinary studies support focused research that integrates cultural competency, health informatics, and policy frameworks to create long-term healthcare solutions for Indian expats (Batko & Ślęzak, 2022; Bashir, 2024) ^[12, 6].

Research methodology

This study adopts a cross-sectional quantitative research design, using a structured questionnaire to assess awareness, perceptions, and experiences regarding health data analytics among Indian expatriates living in Middle Eastern of Abu Dhabi. The sampling technique used here is convenience sampling and a structured questionnaire is used for the same purpose and the data thus obtained is analysed by chi-square and correlation analysis. For this 55 samples were collected randomly and two hypotheses were developed and tested.

Hypothesis

Objective 1

To examine the role of health data analytics in providing personalized and preventive healthcare services to Indian expatriates

- **H₀:** Health data analytics does not have a statistically significant effect on the provision of personalized and preventive healthcare services to Indian expatriates
- **H₁:** Health data analytics has a statistically significant effect on the provision of personalized and preventive healthcare services to Indian expatriates

Objective 2

To assess the utility of aggregated health data in health surveillance and resource allocation targeted at expatriate health needs.

- **H₀:** Aggregated health data does not significantly improve public health surveillance or resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.
- **H₁:** Aggregated health data significantly improves public health surveillance and resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.

Statement of Problem

Indian expatriates confront particular health-related issues

that call for considerate, situation-specific healthcare solutions, notwithstanding these encouraging prospects. Therefore, there is a greater focus on enhancing healthcare delivery methods that meet the requirements of populations living abroad. Emerging data analytics technologies have the potential to revolutionise healthcare experiences by streamlining healthcare navigation, enabling preventive and personalised care, and enhancing the management of chronic diseases.

This research effort is well-positioned to close this knowledge gap by methodically investigating how health data analytics may be used to provide Indian expats with preventive and personalised care, as well as evaluating the usefulness of aggregated data at expatriate communities. In order to improve the quality, accessibility, and effectiveness of healthcare services for Indian expatriates in the Middle East, the findings are intended to educate stakeholders, policymakers, and healthcare professionals on data-driven interventions that work.

Data analysis and critical discussions

The primary question asked to expats where to rate their agreeability on how their health care providers identify and manage their unique health risk successfully. For this most of the respondents agreed and strongly agreed and strongly agreed ie, 29.9 percentage and percentage indicating a positive perception in this aspect. Secondly the agreeability rating regarding electronic health records and their usefulness for analysing healthcare outcomes among the expats were taken.

The research concluded that the response mostly disagree with 45 percentage and above together with the neutral response of 15 percentage have clearly indicated that there is only a limited data sources and effectiveness of the above question.

The agreeability regarding saving of expats health data, and using for preventive health care measures were taken and the result were narrated as 73 percentage agreeing to the same and 9 percentage have a neutral opinion

Chi-Square Analysis

1. The primary hypothesis was tested based on these questions.

A significant level of 0.05 was used and the results were as follows.

H₀: There is no significant relationship between predictive data analytics and preventive health care services

H₁: There is significant relationship between predictive data analytics and preventive healthcare services.

Table 1: Observed and Expected Frequencies

Response Category	Observed Frequency	Expected Frequency
Agree	30	18.33
Neutral	10	18.33
Disagree	15	18.33

Chi-Square Calculation Summary

Chi-Square Statistic (χ^2) = 11.818

Degrees of Freedom (df) = 2

Critical Value (0.05 level) = 5.991

P-value = 0.0027

Inference

Since the p-value is less than 0.05, the null hypothesis (H₀)

is rejected. This indicates a statistically significant relationship between predictive data analytics and preventive healthcare services among expatriates.

2. Secondary Hypothesis

- **H₀:** Aggregated health data does not significantly improve public health surveillance or resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.
- **H₁:** Aggregated health data significantly improves public health surveillance and resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.

Chi-Square Analysis: Aggregated Health Data and Health Surveillance

A chi-square (χ^2) test was conducted at a 0.05 level of significance to examine whether aggregated health data significantly improves public health surveillance and resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.

Hypotheses

- **H₀:** Aggregated health data does not significantly improve public health surveillance or resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.
- **H₁:** Aggregated health data significantly improves public health surveillance and resource allocation targeted at expatriate health needs within Middle Eastern healthcare systems.

Table 2: Observed and Expected Frequencies

Response Category	Observed Frequency	Expected Frequency
Agree	40	18.33
Neutral	8	18.33
Disagree	7	18.33

Chi-Square Calculation Summary Chi-Square Statistic (χ^2) = 38.436

Degrees of Freedom (df) = 2

Critical Value (0.05 level) = 5.991

P-value = 0.0000

Conclusion

Since the p-value is less than 0.05, the null hypothesis (H₀) is rejected. This indicates a statistically significant relationship between aggregated health data and improvements in public health surveillance and resource allocation for expatriate health needs within Middle Eastern healthcare systems.

Findings

1. The study revealed that a majority of expatriates agreed that healthcare providers effectively identify and manage their unique health risks, indicating a positive perception of personalized healthcare delivery.
2. However, respondents expressed limited confidence in the usefulness of electronic health records (EHRs) for analyzing healthcare outcomes, suggesting gaps in data integration and analytical effectiveness.
3. A significant portion of respondents agreed that saving expatriates' health data and using it for preventive health measures can enhance overall healthcare

outcomes.

4. The chi-square analysis indicated a statistically significant relationship between predictive data analytics and preventive healthcare services, emphasizing the role of data-driven insights in early health risk detection.
5. The subsequent chi-square analysis for aggregated health data demonstrated a significant impact on improving public health surveillance and efficient resource allocation targeted at expatriate populations within Middle Eastern healthcare systems.

Suggestions

1. Strengthen electronic health record (EHR) systems to ensure interoperability, data accuracy, and usability across healthcare institutions.
2. Implement robust predictive analytics frameworks to monitor expatriate health trends and identify potential outbreaks or health risks early.
3. Encourage public-private partnerships to facilitate the aggregation and ethical use of expatriate health data for preventive and policy-level decision-making.
4. Conduct continuous training for healthcare professionals on data analytics tools and techniques to improve evidencebased decision-making.
5. Introduce policies to ensure data privacy, transparency, and consent when managing expatriate health information.

Scope for Future Research

Future studies can explore longitudinal data to evaluate how predictive analytics influence healthcare outcomes over time among expatriate populations.

Comparative analyses across different regions or countries can be undertaken to understand variations in healthcare data utilization.

Further research could include qualitative interviews with healthcare professionals and expatriates to gain deeper insights into data-driven healthcare challenges. Examination of the cost-effectiveness and implementation challenges of predictive and aggregated health data systems in developing economies could enrich future work.

Investigations into artificial intelligence (AI)-based predictive health models and their ethical implications in expatriate healthcare would provide valuable contributions.

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