Estimation and Prediction of Hospitalization and Medical

Category: Data Analytics

Team ID: LTVIP2023TMID00325

Team Size: 5

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1.INTRODUCTION

1.1 Overview

Estimation and Prediction of Hospitalization and Medical Care Costs is a data analytics project focused on analysing and forecasting the expenses associated with hospitalization and medical treatments. The primary goal is to develop models that can accurately estimate the costs incurred by patients and healthcare providers for various medical procedures and hospital stays.

Data Collection and Pre-processing:

A comprehensive dataset was collected from **Kaggle** Which includes age, sex, region, charges, smoker, BMI.

1.2 Purpose

The Estimation and Prediction of Hospitalization and Medical Care Costs project plays a vital role in data-driven decision-making, cost optimization, and improving patient care in the healthcare industry. It empowers various stakeholders with actionable insights to make informed choices and enhance the overall efficiency of the healthcare system.

By undertaking the Estimation and Prediction of Hospitalization and Medical Care Costs project, several significant achievements and benefits can be realized in the healthcare industry and beyond.

2. LITERATURE SURVEY

2.1 Existing problem

Solving the Estimation and Prediction of Hospitalization and Medical Care Costs involves a systematic approach that combines data analysis, model development and evaluation.

2.2 Proposed solution

Proposing a solution for the estimation and prediction of hospitalization and medical care costs involves a combination of data-driven techniques, advanced analytics, and domain expertise. Collect comprehensive and diverse data related to hospitalization and medical care costs from various sources, including electronic health records, insurance claims, and administrative databases.

3. THEORITICAL ANALYSIS

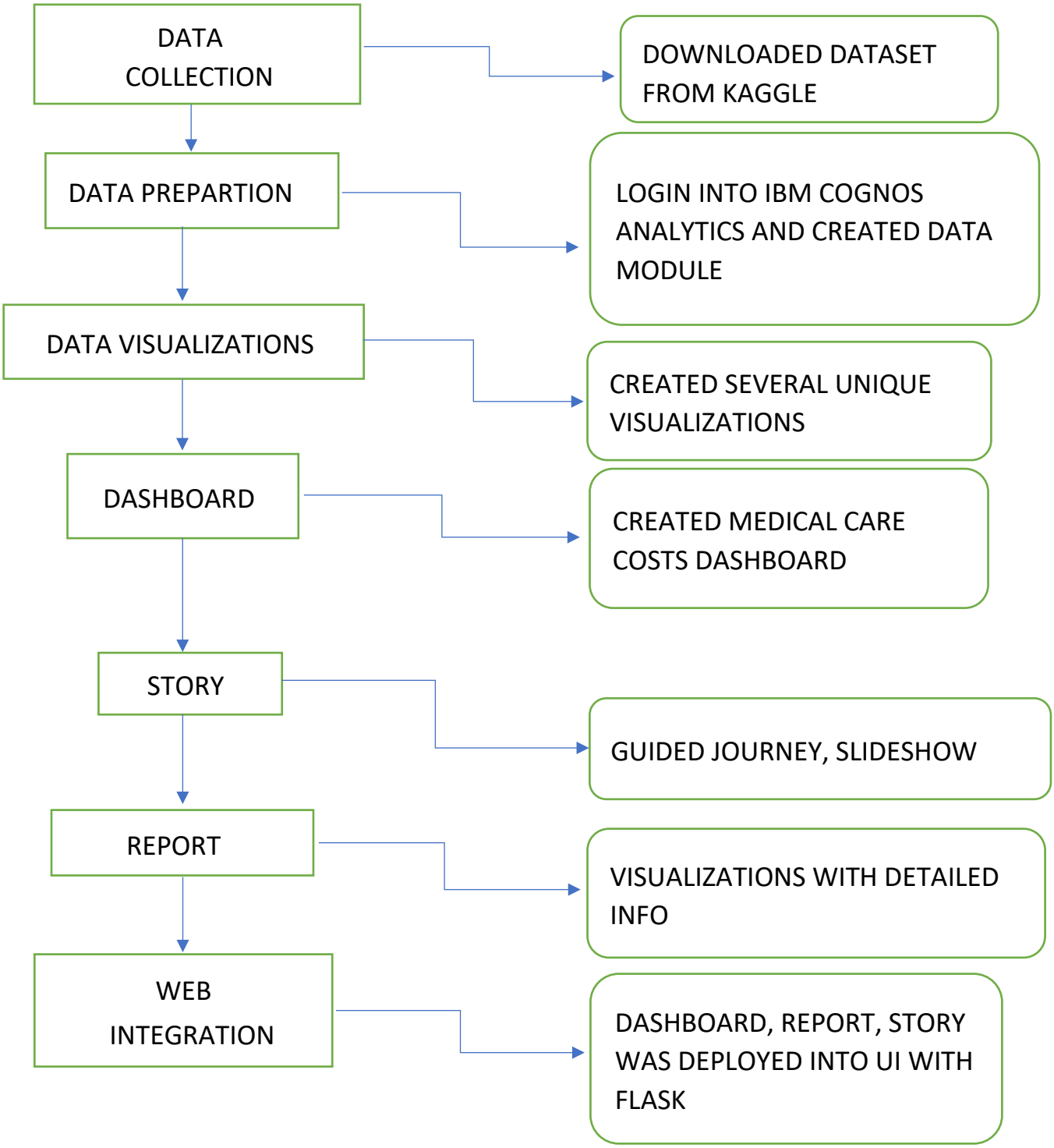
The theoretical analysis in this context refers to the examination and evaluation of the underlying principles, methodologies, and concepts used in the estimation and prediction of hospitalization and medical care costs.

3.1 Block diagram

The block diagram illustrates the end-to-end process of estimating and predicting hospitalization and medical care costs, starting from data collection and pre-processing to deploying the final models for cost estimation and future cost prediction.

Estimation and Prediction of Hospitalization and Medical

BLOCK DIAGRAM



3.2 Hardware / Software designing

- **Software Requirements:**

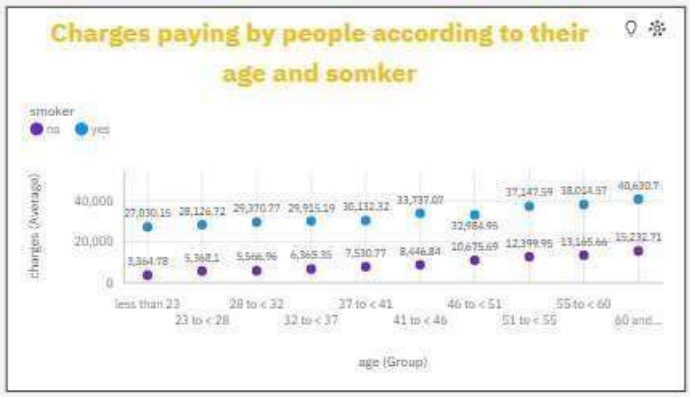
  - IBM Cognos analytics Tool
  - Flask
  - Integrated Development Environment (IDE)-Spyder

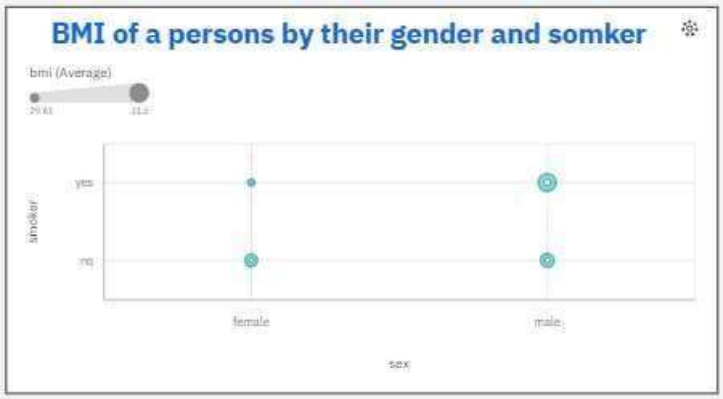
- **Hardware Requirements:**

  - Minimum System Requirements (RAM-4GB, Quad core Processor Or above).

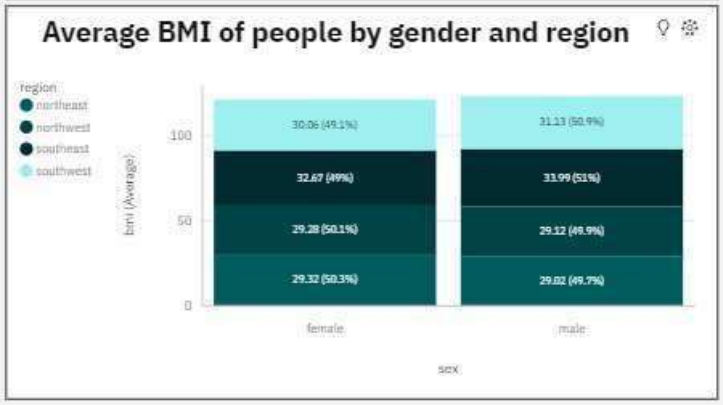
4. RESULT

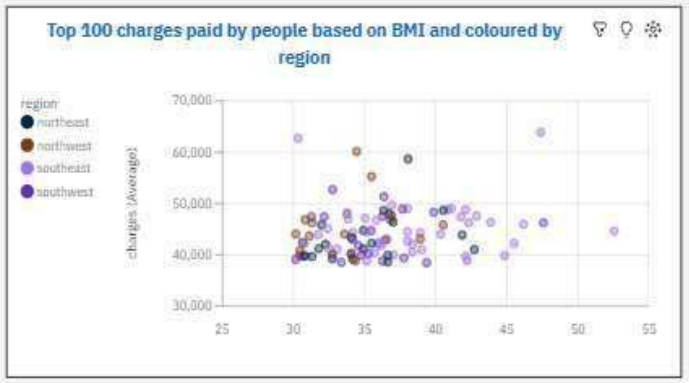
MEDICAL CARE COSTS OF DASHBOARD

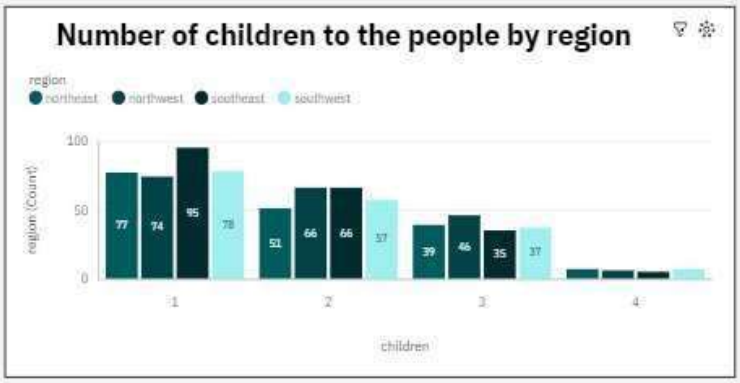

Charges paying by people according to their age and somker
smoker
no
yes
charges (Average)
40,000
20,000
0
27,030.15
28,126.72
29,370.77
29,915.19
30,132.32
33,737.07
32,984.95
37,147.59
38,014.57
40,630.7
3,364.78
5,368.1
5,566.96
6,365.35
7,530.77
8,446.84
10,675.69
12,399.95
13,165.66
15,232.71
less than 23
23 to < 28
28 to < 32
32 to < 37
37 to < 41
41 to < 46
46 to < 51
51 to < 55
55 to < 60
60 and...
age (Group)

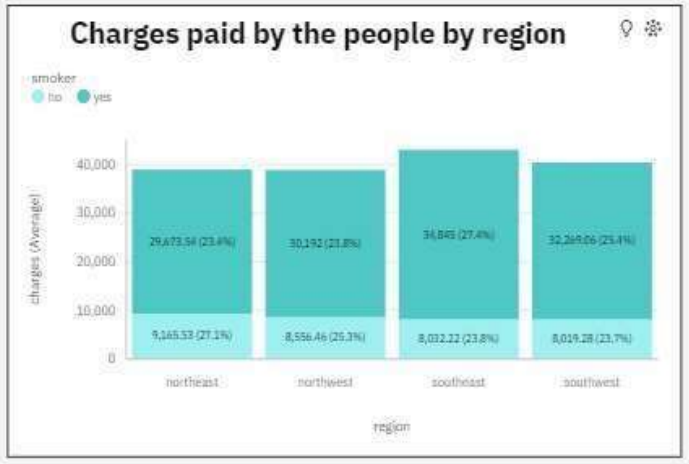

BMI of a persons by their gender and somker
bmi (Average)
smoker
yes
no
female
male
sex

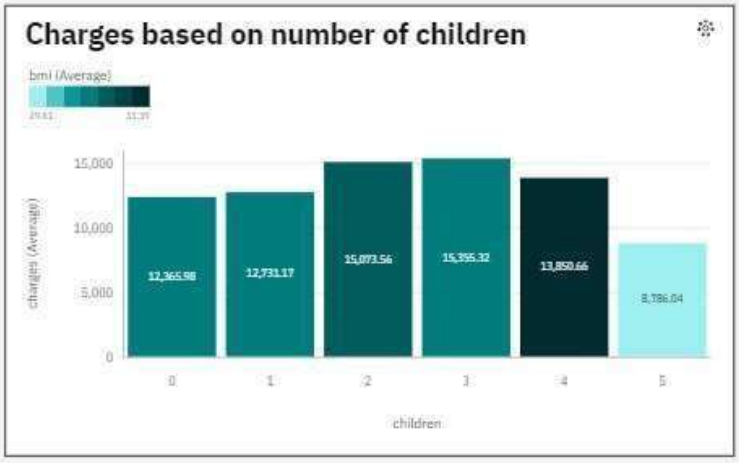

Charges paid by people according to their gender, region and smoker
charges (Average)
region - smoker
northeast | no
northeast | yes
northwest | no
northwest | yes
southeast | no
southeast | yes


Average BMI of people by gender and region
region
northeast
northwest
southeast
southwest
bmi (Average)
100
50
0
30.06 (49.1%)
31.13 (50.9%)
32.67 (49%)
33.99 (51%)
29.28 (50.1%)
29.12 (49.9%)
29.32 (50.3%)
29.02 (49.7%)
female
male
sex


Top 100 charges paid by people based on BMI and coloured by region
region
northeast
northwest
southeast
southwest
charges (Average)
70,000
60,000
50,000
40,000
30,000
25
30
35
40
45
50
55

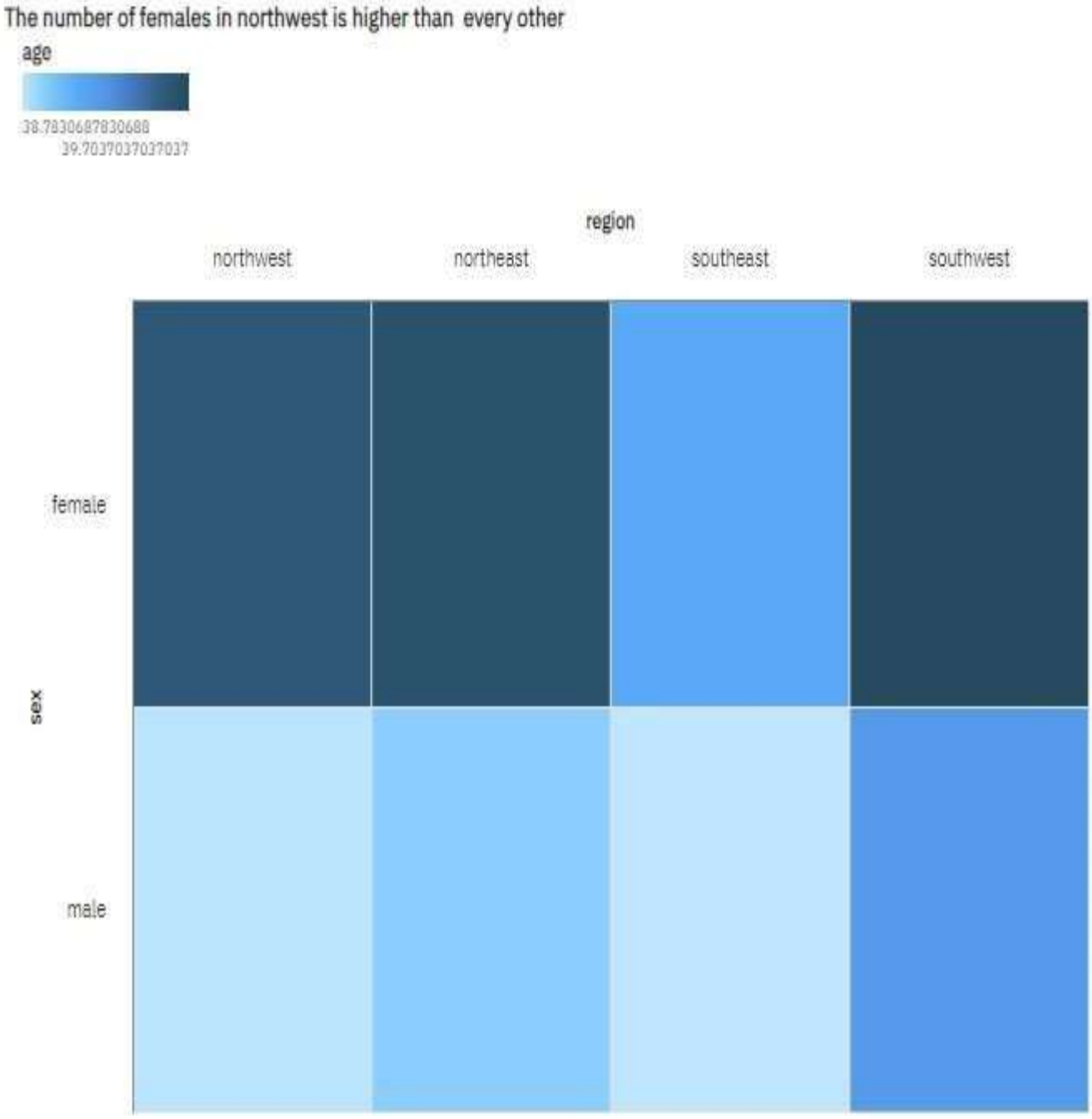

Number of children to the people by region
region
northeast
northwest
southeast
southwest
region (Count)
100
50
0
77
74
95
78
51
66
66
57
39
46
35
37
1
2
3
4
children


Charges paid by the people by region
smoker
no
yes
charges (Average)
40,000
30,000
20,000
10,000
0
29,673.54 (23.4%)
30,192 (23.8%)
34,845 (27.4%)
32,269.06 (25.4%)
9,165.53 (27.1%)
8,556.46 (25.3%)
8,032.22 (23.8%)
8,019.28 (23.7%)
northeast
northwest
southeast
southwest
region


Charges based on number of children
bmi (Average)
charges (Average)
15,000
10,000
5,000
0
12,365.98
12,733.17
15,073.56
15,395.32
13,850.66
8,786.04
0
1
2
3
4
5
children

MEDICAL CARE COSTS REPORT

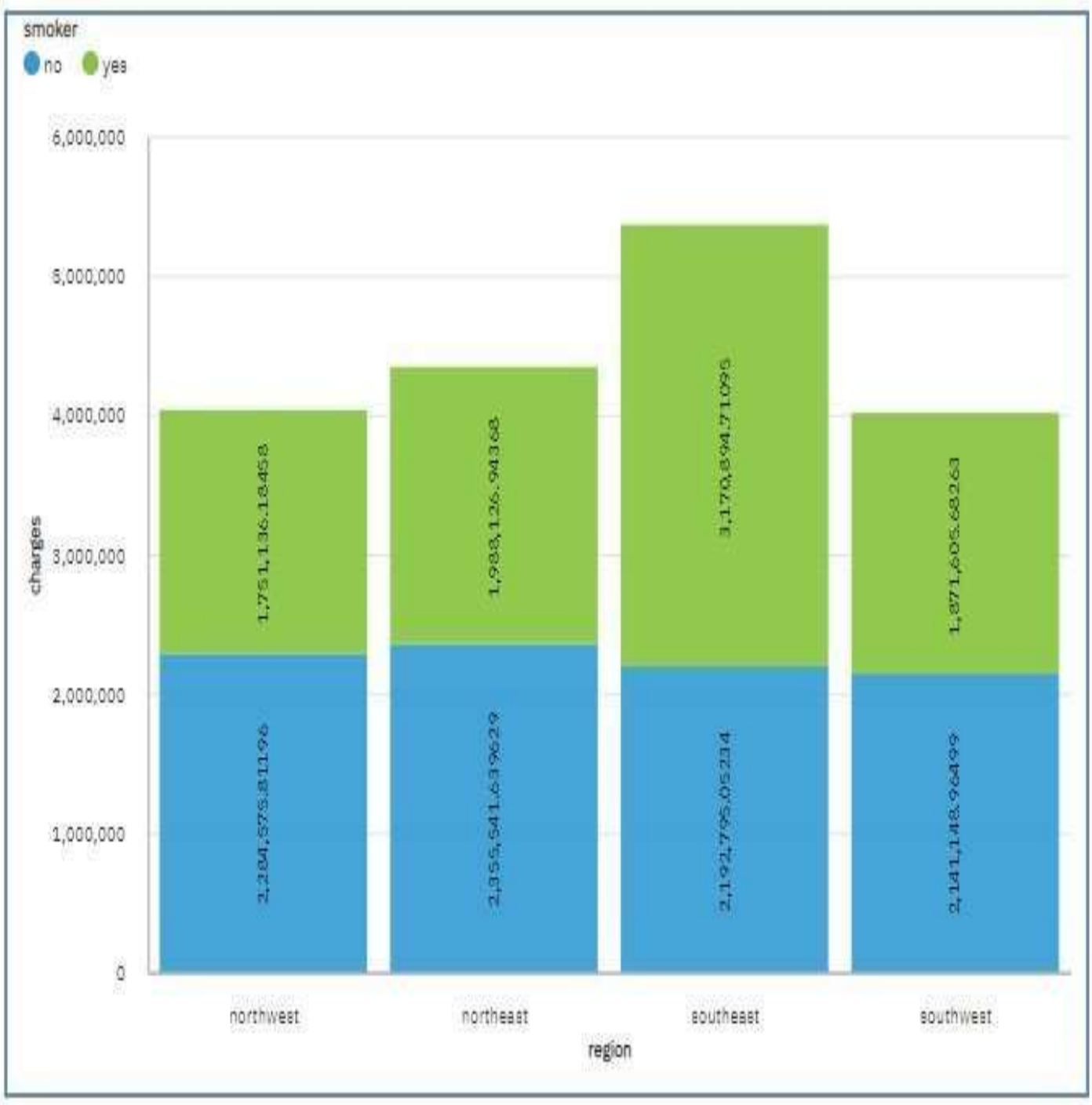
PAGE 1



PAGE 2


region
northwest
northeast
southeast
southwest
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
bmi
4,869.8
5,717.47
4,721.215
4,801.585
5,074.1
6,424.11
4,731
4,688.345
female
male
sex

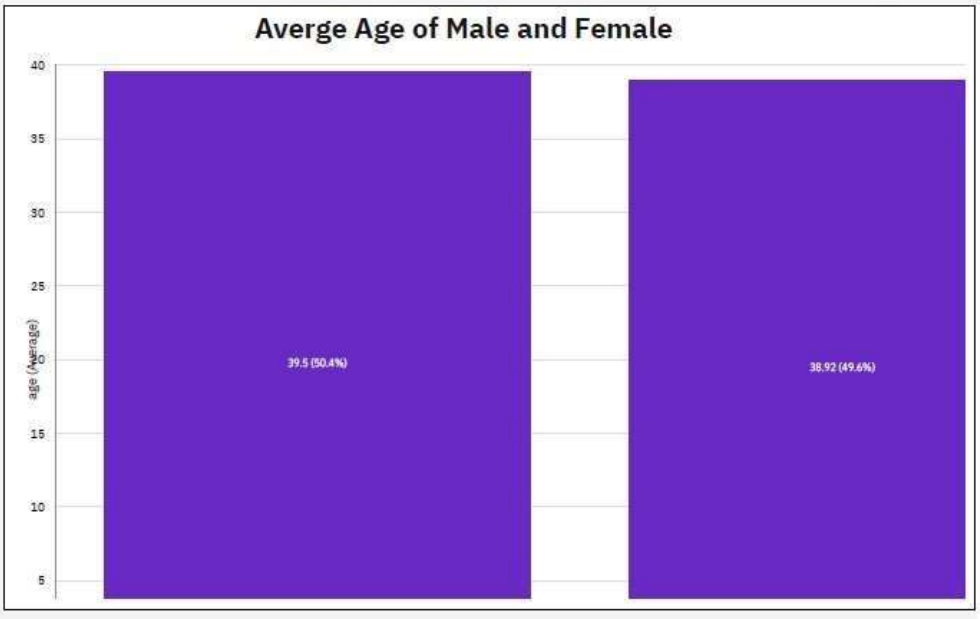
PAGE 3


smoker
no
yes
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
charges
1,751,136.18458
1,933,126.94368
3,170,894.71096
1,371,605.68263
2,284,575.81196
2,355,541.63929
2,192,795.05234
2,141,148.96499
northwest
northeast
southeast
southwest
region

MEDICAL CARE COSTS STORY

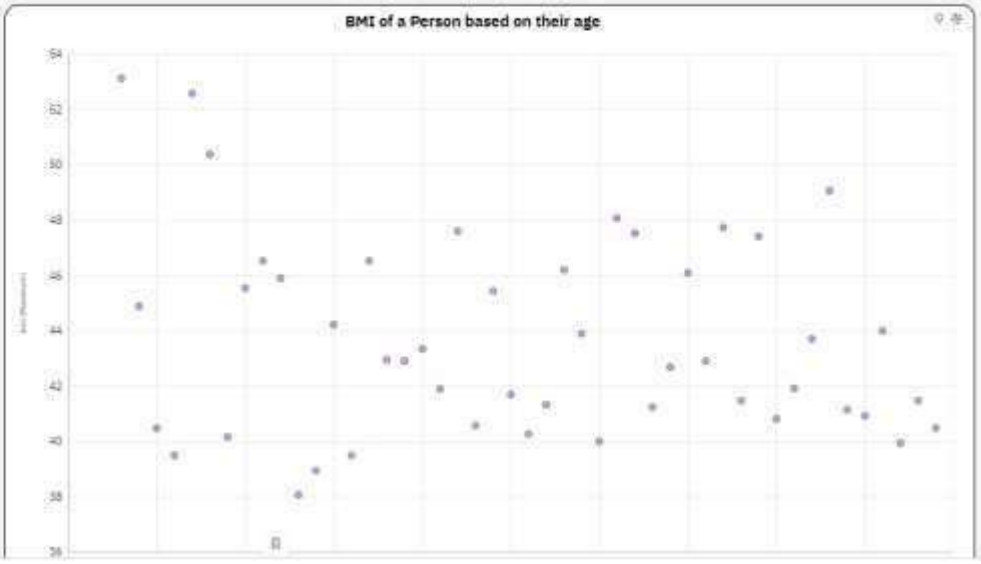
Medical Care Costs story

- This graph mainly represents the average age of males and females and as we the female average is higher.
- The average age of females is higher despite having a little bit less number of females in the overall dataset.



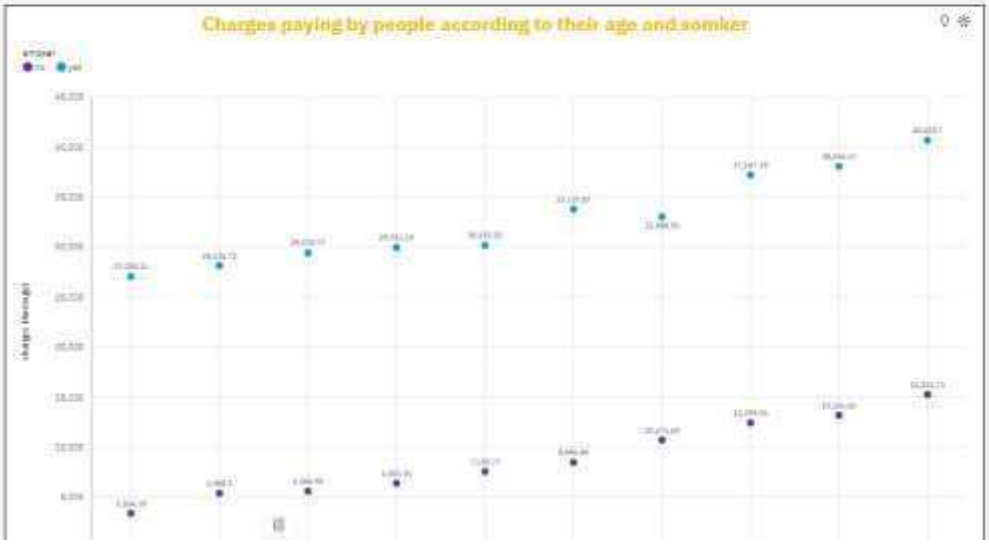
Medical Care Costs Story

- As age is incressing average BMI of persons is also increases. this means BMI and age are linearly proportional.
- The maximum value of BMI by is like in middle age group its little bit higher but is age increases the BMI value is getting decreased.



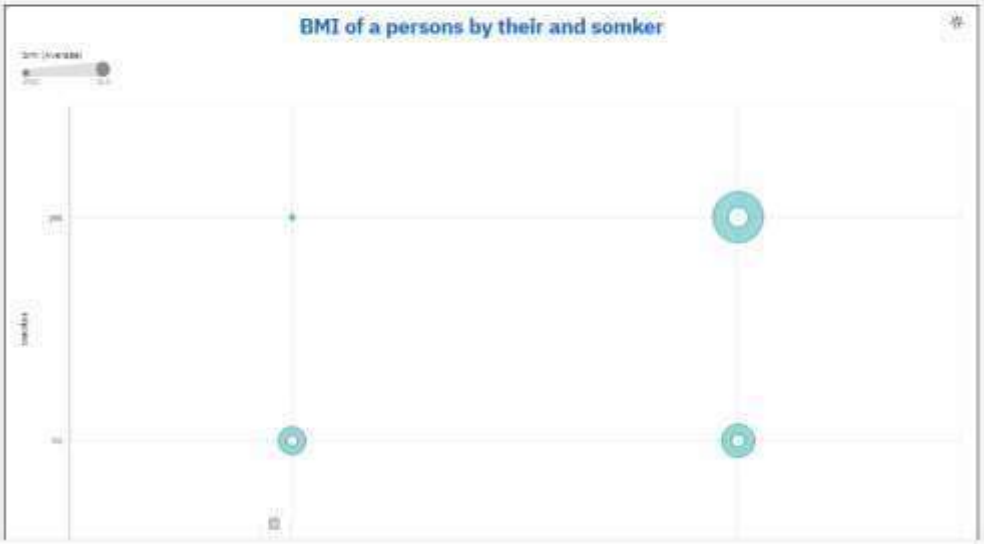
Medical care costs Story

- Smokers of any age are paying more than non-smokers, the value is also almost 3 to 5x higher.
- charger are getting increased as the age is also increasing in both scenarios.



Medical care costs Story

- Males and smokers have the highest average BMI value compared to all.
- Females and smoker have the less average BMI value compared to all.
- Increase non-smokers irrespective of gender their average BMI is almost similar.

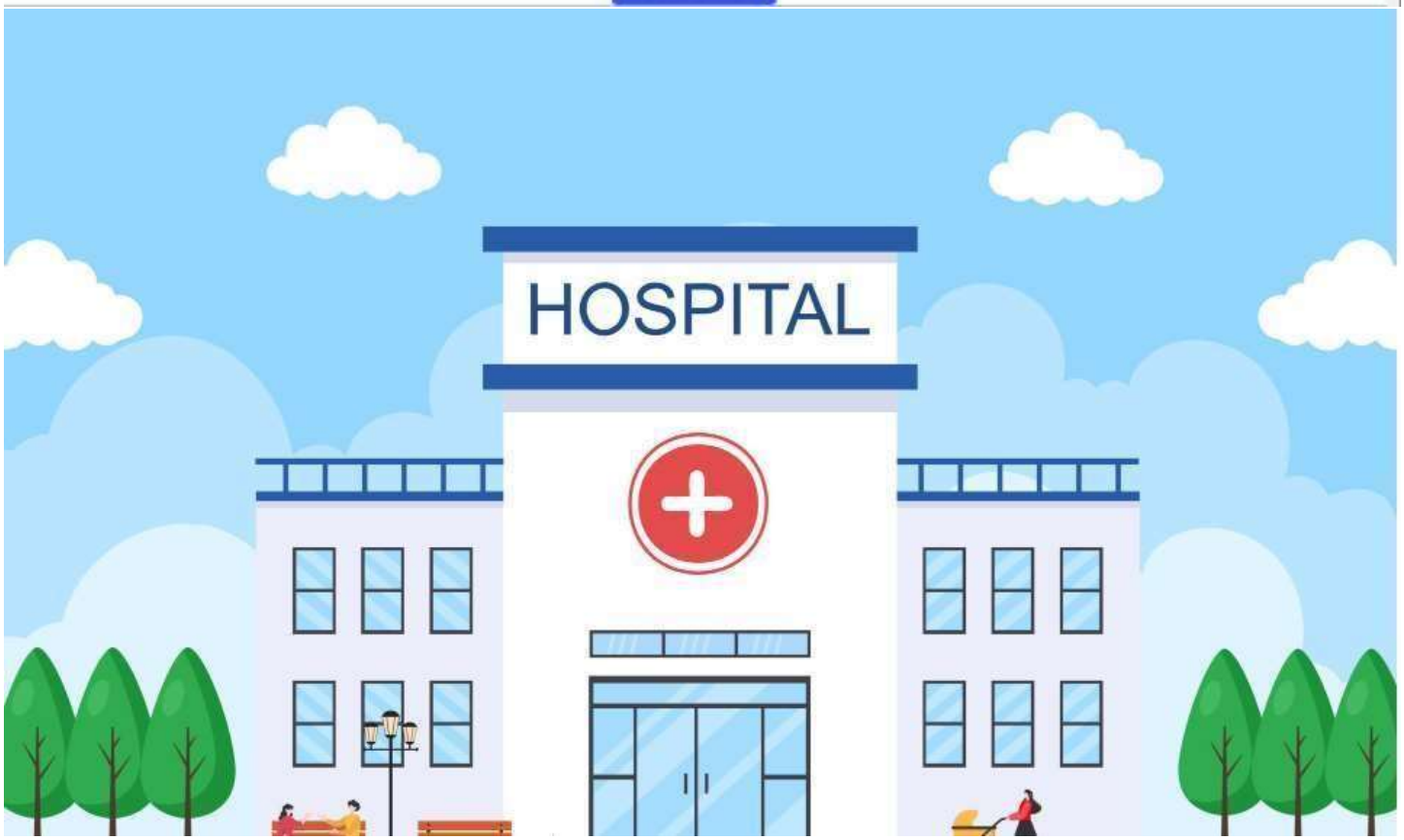


Medical care costs Story

- Southeast region people, both men and women are paying more charges compared to other regions.
- south-east region smokers a the ones who paying more charges.
- out of all as we have seen smokers tend to pay more irrespective of region.

Smoking is Not only Injuries to health but also for Wealth

WEB INTEGRATION



Medical Care Costs in India

Home Dashborad Story Report Contact

Dashboard

Medical Care Costs in India

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Story

Medical Care Costs in India

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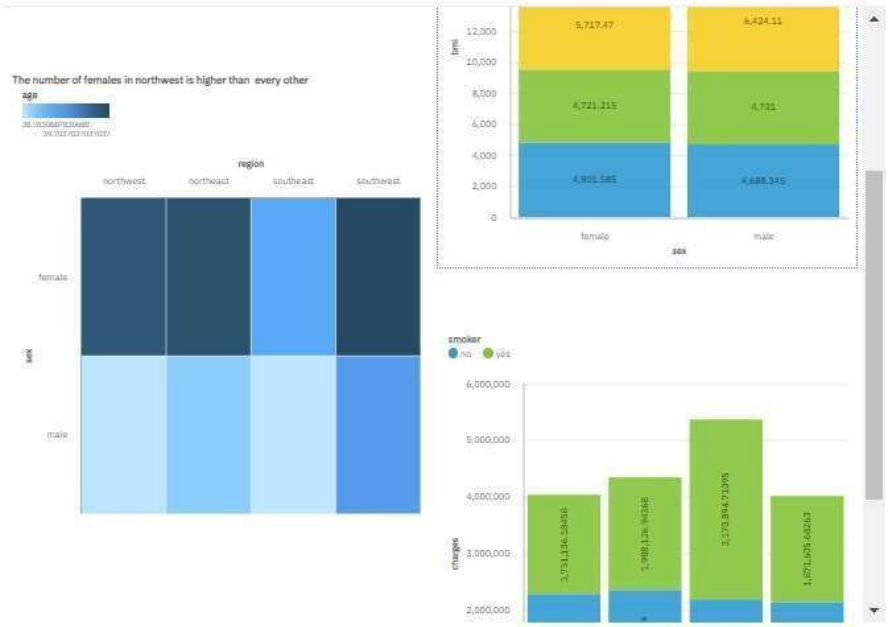
Report



Medical Care Costs in India

Home Dashborad Story Report Contact

Contact

Magnam dolores commodi suscipit. Necessitatibus eius consequatur ex aliquid fuga eum quidem. Sit sint consectetur velit. Quisquam quos quisquam cupiditate. Et nemo qui impedit suscipit alias ea. Quia fugiat sit in iste officiis commodi quidem hic quas.

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A108 Adam Street, New York, NY 535022

Email Us

info@example.com

contact@example.com

Call Us

+1 5589 55488 55

+1 6678 254445 41

Your Name

Your Email

Subject

Message

Send Message

5.ADVANTAGES & DISADVANTAGES

○ ADVANTAGES

- Financial Planning: Accurate estimation and prediction of hospitalization and medical care costs help healthcare facilities and insurance companies plan their budgets and allocate resources more efficiently.
- Resource Allocation: Hospitals and healthcare organizations can use cost estimates to allocate staff, equipment, and other resources appropriately, ensuring smooth operations and optimal patient care.
- Patient Awareness: Patients can benefit from cost estimation and prediction as they can plan and make informed decisions about their healthcare options, understand potential out-of-pocket expenses, and explore different payment options.
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- Research and Development: Estimating and predicting costs can provide valuable insights for researchers and academics to understand healthcare cost trends, identify cost drivers, and develop innovative costcontainment strategies.
- Cost Reduction: Identifying high-cost areas and inefficient practices can lead to cost-saving measures and more cost-effective healthcare delivery.

O DISADVANTAGES

- Complexity and Uncertainty: Hospitalization and medical care costs are influenced by various factors, including medical conditions, treatment modalities, patient demographics, and local healthcare systems. Predicting all these variables accurately can be challenging, leading to uncertainties in cost estimation.

- Data Availability and Quality: Accurate predictions require comprehensive and reliable data, including historical cost data, patient records, and demographic information. Data availability and quality issues can affect the accuracy of cost predictions.

- Ethical Concerns: In some cases, focusing solely on cost prediction may raise ethical concerns, as it might lead to decisions prioritizing cost-cutting over patient care quality.

- Limited Predictive Power: The healthcare landscape is constantly evolving, and external factors like changes in medical technology, reimbursement policies, or pandemics can significantly impact cost predictions, making long-term forecasts less reliable.

- Overemphasis on Cost: Over-reliance on cost predictions may lead to cost-centric healthcare delivery, potentially compromising the quality of care or restricting access to necessary treatments.

- Sensitivity to Assumptions: Predictive models are often based on assumptions, and small changes in these assumptions can lead to substantial differences in cost estimates, making it crucial to validate and update the models regularly.

6. APPLICATIONS

Estimation and prediction of hospitalization and medical care costs can be applied in various areas within the healthcare industry.

- Hospital Financial Management
- Health Insurance and Payer Strategies
- Patient Cost Transparency
- Value-Based Care Initiatives
- Healthcare Policy and Regulation
- Research and Clinical Trials
- Population Health Management

7.CONCLUSION

In conclusion, the estimation and prediction of hospitalization and medical care costs offer significant advantages and present certain challenges in the

healthcare industry. This analytical approach plays a pivotal role in financial planning, resource allocation, and policy development for healthcare facilities, insurance companies, policymakers, and patients.

8.FUTURE SCOPE

The future of estimation and prediction of hospitalization and medical care costs holds great potential for further advancements and improvements.

The future scope of estimation and prediction of hospitalization and medical care costs will involve a convergence of advanced technologies, data-driven insights, and a patient-centric approach. By embracing these trends, the healthcare industry can work towards delivering high-quality care while effectively managing costs, contributing to a more sustainable and equitable healthcare system for the future.