

Diabetes Risk Analysis

Uncovering Health Patterns Through Data

Executive Summary

768

Total Patients

34.9%

Diabetes Prevalence

33.2

Average Age

Key Discovery

Diabetes prevalence of 34.9% is significantly higher than the global average of ~11%, indicating a high-risk population requiring targeted interventions.

The Diabetes Risk Paradox

Traditional Assumption

Diabetes primarily affects older, obese individuals with high blood pressure

Data Reality

Complex, multi-factorial condition affecting diverse populations with unexpected patterns

Surprising Findings:

- **Young Population Risk:** Significant diabetes rates in patients averaging 33.2 years
- **Normal Weight Risk:** 6.4% diabetes rate in normal BMI patients
- **Blood Pressure Paradox:** 30.8% diabetes rate even in normal BP patients
- **Underweight Risk:** 11.8% diabetes rate in underweight individuals

Age & Glucose Relationship

Key Insights from Age-Glucose Analysis:

- **Volatile Pattern:** Glucose levels fluctuate dramatically across age groups
- **Peak Risk Periods:** Ages 45-55 show consistently high glucose (>140 mg/dL)
- **Early Onset:** Younger patients (20-30) show high variability, suggesting aggressive early diabetes
- **Non-Linear Relationship:** Challenges traditional age-based risk models

Clinical Implication

The irregular glucose-age pattern suggests genetic or lifestyle factors play a more significant role than previously thought, requiring personalized risk assessment approaches.

BMI Categories & Diabetes Risk

31.7%

Obese Patients

18.3%

Overweight Patients

6.4%

Normal Weight

Unexpected Finding

Even underweight patients show 11.8% diabetes rate, indicating that BMI alone is insufficient for risk assessment. This challenges the obesity-diabetes assumption and suggests metabolic dysfunction can occur across all weight categories.

Blood Pressure Risk Stratification

Diabetes Rates by BP Category:

- **Hypertensive (> 100 mmHg):** 36.7% diabetes rate
- **High-Normal (80-100 mmHg):** 28.6% diabetes rate
- **Normal (<80 mmHg):** 30.8% diabetes rate

Surprising Insight

Normal blood pressure patients show substantial diabetes risk (30.8%), suggesting that other metabolic factors play crucial roles beyond cardiovascular health indicators.

Implication: Comprehensive metabolic screening is essential regardless of blood pressure status.

Clinical Implications & Recommendations

Immediate Actions

- Expand early screening programs for patients under 35
- Develop composite risk scores beyond BMI
- Implement glucose monitoring for all BMI categories

Long-term Strategy

- Design longitudinal studies to track progression
- Develop ML models for personalized risk prediction
- Integrate with electronic health records

Business Value:

- **Healthcare:** Earlier risk identification and targeted interventions
- **Public Health:** Evidence-based prevention programs
- **Insurance:** Refined actuarial models and risk assessment

Conclusion

Key Takeaways

Data Challenges Assumptions

This analysis reveals diabetes as a complex condition that doesn't follow traditional risk patterns, affecting diverse populations across age, weight, and blood pressure categories.

Technical Skills Demonstrated:

- **Advanced Analytics:** Pattern recognition in complex healthcare data
- **Data Visualization:** Created intuitive, multi-dimensional dashboards
- **Domain Expertise:** Applied clinical knowledge to data interpretation
- **Business Intelligence:** Translated insights into actionable strategies

Impact

These insights provide a foundation for more nuanced healthcare strategies and demonstrate the power of data-driven decision making in clinical settings.