



SHUDARSHANA
BRIGHT DAYS

DIABETES RISK PREDICTION

Leveraging Advanced Analytics for Proactive Health



HEALTHCARE

THE RESEARCH



THE PROBLEM
73% OF WOMEN ARE UNAWARE THEY HAVE GDM

↓ LEADS TO

NO DIAGNOSIS

No Screening → No Diagnosis → No Testing Done



Undiagnosed rate: 68-73% in developing countries

↓

UNMANAGED PREGNANCY

HIGH BLOOD SUGAR NOT CONTROLLED

Baby develops excessive insulin production
Result: Fetal complications develop



SEVERE COMPLICATIONS

NEONATAL DEATH:
4.5x higher odds

STILLBIRTH:
6.4x higher risk

RESPIRATORY DISTRESS:
Birth complications

TYPE 2 DIABETES:
75-80% will develop



OUTCOMES: POOR

252 MILLION preventable diabetes deaths globally
3.4 MILLION die yearly from preventable diabetes
GDM directly causes preventable deaths

↓



EARLY AWARENESS + SCREENING + DIAGNOSIS + TREATMENT

SAVES LIVES - Reduces adverse outcomes by 60-80%

COMPARISON: GDM vs TYPE 1 vs TYPE 2 DIABETES IN PREGNANCY

GESTATIONAL DIABETES



Onset: During pregnancy only - Weeks 24-28 typically



Cause: Placental hormones reduce insulin sensitivity



Prevalence:
14-15% of pregnancies

1 in 10 women

Treatment:

- Dietary modification (first-line)
- Insulin injection if needed: 14.1% (insulin injection 20-30%)
- Monitoring death 6.9%
- Neonatal
- Weekly glucose logs



Pregnancy outcomes:

- Returns to normal: 70-80% of women
- Type 2 develops: 20-30% in first 5 years
- Lifetime Type 2 risk 60%

Maternal mortality: No increase in GDM alone ✓

TYPE 2 DIABETES

Onset: Before pregnancy - Often 30+ years old



Genes: Genetic predisposition + lifestyle



Serum Ins

Olfarmisn

Less Common

Treatment:

- Oral medications (metformin: 1-2x HIGHER)
- Insulin injections (common)
- Multiple daily injections
- Strict & glucose control required
- Neonatal
- Congenital anomalies: Possible



Postpartum:

- Diabetes continues for life
- Requires lifelong medication
- Kidney disease risk High

Maternal mortality: 0.51% (5-20x higher) !

TYPE 1 DIABETES

Onset: Usually childhood/young adulthood



Autoimmune destruction of pancreatic beta cells



0.18 to 0.3% pregnant women

Very Rare

Treatment:

- Beta cell regeneration (rare: 1-2x HIGHER)
- Macrosomia ONLY - 18%
- Stillbirth daily (with poor control, much higher)
- Very strict glucose control Possible
- Congenital anomalies 2-3x Higher (if HbA1c >8%)
- Risk of congenital anomalies if uncontrolled >8%

Postpartum:

- Diabetes continues for LIFE
- Requires lifelong intensive insulin
- Kidney disease common

Maternal mortality with poor glucose control !

Prevalence	GDM	Insulin Need	Metformin lifelong increases risk High
Insulin Need	10-30%	70-70%	1.30%
Pregnancy Resolution	100%	0% (continues)	1.7%
Maternal Mortality	Normal	Maternal Mortality	0-2x
Congenital Anomalies	Rare	N/A (already crude)	1.8x
		N/A	Lifelong (already T2 crude)

GDM BOX

Most common form of diabetes in pregnancy
Usually resolves after delivery
PREVENTION possible with lifestyle

TYPE 2 BOX

Pre-existing diabetes complicates pregnancy
Higher complication rates than GDM
Kidney disease most

TYPE BOX

Rarest in pregnancy but highest risk
Requires intensive insulin management
Rig glucose control essential

Key Difference: GDM is often REVERSIBLE with lifestyle changes

Type 1 & 2 require LIFELONG diabetes management

CUSTOMER PAIN POINTS

1. For the Expectant Mother (The Patient)

- Anxiety & Uncertainty
- Monitoring Fatigue
- Access Barriers



2. For the Clinician (The Doctor)

- Information Lag
- Administrative Overload
- Subjective Risk Profiling



3. For the Healthcare System System (. Administrator)

- Reactive Costs
- Inequitable Outcomes
- Long-term Burden



Dashboard

Risk Analysis

AI Assistant

Pop. Stats

RISK EVALUATION

12.5%

Predictor Standby

CRITICAL ALERTS

0

Risk thresholds monitored

SAFETY SCORE

98%

Global baseline average

Daily Health Pulse

"Consistent hydration reduces blood viscosity and helps regulate blood sugar levels naturally."

NEXT INSIGHT

Required Clinical Reports

HbA1c (Glycated Hemoglobin)

Fasting Lipid Profile

Kidney Function Test (KFT)



THE PROBLEM

Problem Statement

In the current healthcare landscape, **Gestational Diabetes Mellitus (GDM)** and maternal health complications often go undetected until they reach a critical stage, particularly in underserved or rural areas. Traditional diagnostic methods are frequently hindered by several "pain points" identified in clinical research:

- **Delayed Triage:** Manual clinical screenings are time-consuming and often occur too late to prevent preventable maternal morbidity.
- **Subjectivity in Risk Assessment:** Relying solely on static factors like age and BMI leads to subjective interpretations and a high rate of missed early-warning signs.
- **Resource Disparity:** Roughly **287,000 to 300,000** women die annually from pregnancy-related causes, with rural populations being nearly **twice as likely** to suffer fatal outcomes due to a lack of specialized diagnostic tools and obstetricians.
- **Data Fragmentation:** Clinicians often lack a unified system to process bulk patient data rapidly, leading to "maternity care deserts" where high-risk patient clusters remain invisible to health administrators.



OUR SOLUTION

Theoretical Framework: Meta-AI for GDM Risk Stratification

1. The Core Problem

The system addresses the critical gap in **Gestational Diabetes Mellitus (GDM)** diagnostics. Traditional methods suffer from **Delayed Triage** and **Subjectivity**, particularly in "maternity care deserts." By the time GDM is manually diagnosed via routine screenings, the risk of maternal and neonatal morbidity has often already escalated.

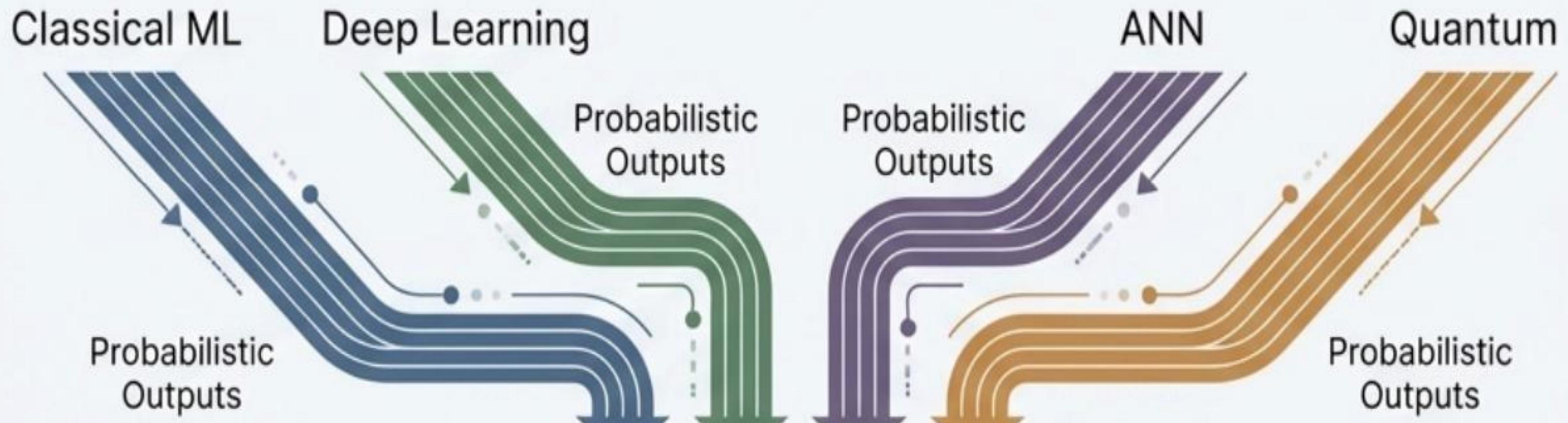
2. The Solution Architecture: "Weighted Fusion"

Our solution moves beyond simple binary classification. It utilizes a **Meta-AI Decision** engine that aggregates intelligence from three distinct algorithmic "streams." This mimics a medical board where multiple specialists (the models) provide opinions, and a lead consultant (the Meta-AI) makes the final call based on the reliability of each specialist.

3. The Three Intelligence Streams

Each stream analyses the patient's vitals (Glucose, BMI, Age, etc.) through a different lens:

- **Classical ML Stream:** Likely using algorithms like Random Forest or Logistic Regression. This provides a robust baseline based on historical statistical patterns.
- **Artificial Neural Network (ANN) Stream:** Deep learning layers that capture non-linear relationships and complex interactions between variables (e.g., how Age combined with Insulin levels increases risk exponentially).
- **Quantum-Logic Stream (Simulated):** In your code, this is represented as a transformation of the classical output ($P_{ml} \times 0.95$). Theoretically, this represents high-dimensional optimization, finding "shortcuts" in the data features that traditional models might miss.



Key Mechanism:
Weighted Fusion

Meta-AI Decision

Critical Feature:
Uncertainty Aware

OUR SOLUTION

Technical Mechanism

- **Data Processing & Normalization**

The system employs a **StandardScaler**. This is crucial because clinical parameters have vastly different scales (e.g., Glucose might be 150, while DPF is 0.5). Without scaling, the model would mistakenly prioritize the feature with the higher numerical value rather than the higher clinical significance.

Meta-AI Decision Engine

Instead of just averaging the scores, your system uses **Weighted Fusion**. The Meta-AI model (meta_ai.joblib is trained to know which stream is most accurate under specific conditions.

Uncertainty Awareness: By calculating the standard deviation (sigma) between the three streams, the system measures "model discordance." If the streams disagree significantly, the uncertainty score rises, signaling that the case requires human clinical oversight.

$$\text{Final Risk} = f(P_{\text{classical}}, P_{\text{ann}}, P_{\text{quantum}})$$

The User Interface (Holographic Clinical Suite)

The frontend serves as a **Decision Support System (DSS)**. It translates complex probabilities into:

Visual Risk Gauges: Immediate visual cues for clinicians.

Multilingual Accessibility: Bridging the gap in rural areas by supporting English, Telugu, and Hindi.

Conversational AI: Using the Gemini API to provide educational dietary and lifestyle interventions, turning "data" into "actionable advice."

MINIMUM VIABLE PRODUCT

PLATFORM PREVIEW



The screenshot shows the Risk2Relief platform's home page with a dark theme. At the top, there are language and engine selection dropdowns. Below them are four main cards: "RISK EVALUATION" (12.5%, Predictor Standby), "CRITICAL ALERTS" (0, Risk thresholds monitored), "SAFETY SCORE" (98%, Global baseline average), and "Daily Health Pulse" (text: "Consistent hydration reduces blood viscosity and helps regulate blood sugar levels naturally.", button: "NEXT INSIGHT"). To the right, there's a section titled "Required Clinical Reports" listing HbA1c, Fasting Lipid Profile, and Kidney Function Test (KFT), each with a download icon. A large, semi-transparent circular overlay in the background features a molecular structure and a green gradient.

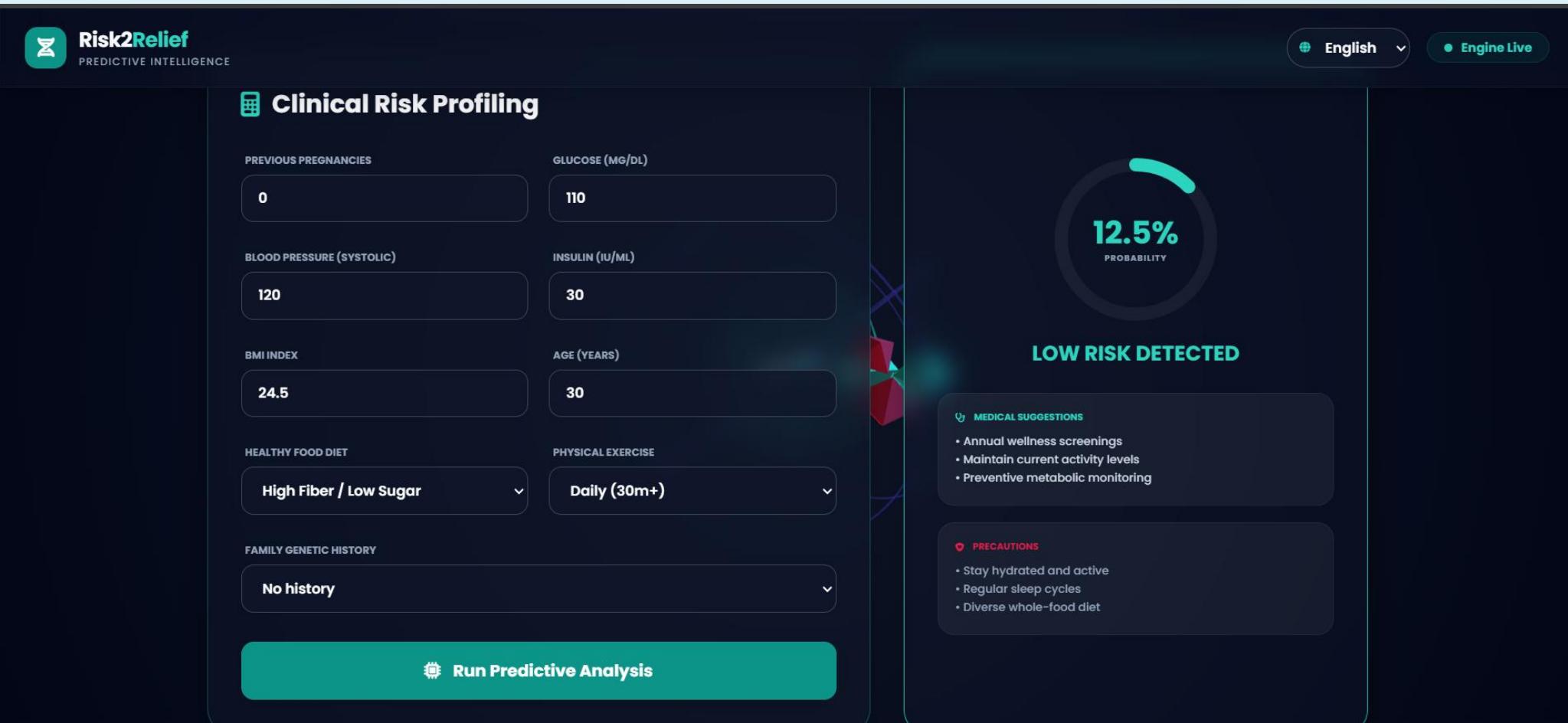
The screenshot shows the Risk2Relief platform's dashboard. It includes a "DAILY HEALTH PULSE" card with the same hydration message and a "NEXT INSIGHT" button. Below it is a "REQUIRED CLINICAL REPORTS" section with the same three tests as the home page. To the right is a "History Over Time" chart showing fluctuating data from January to June. At the bottom right is an "AI Health Insights" section with the text: "Our molecular engine is currently analyzing your baseline data. Run a 'Risk Analysis' to generate personalized insights." The overall design is consistent with the home page, featuring a dark theme and a prominent molecular structure overlay.

1

HOME PAGE

2

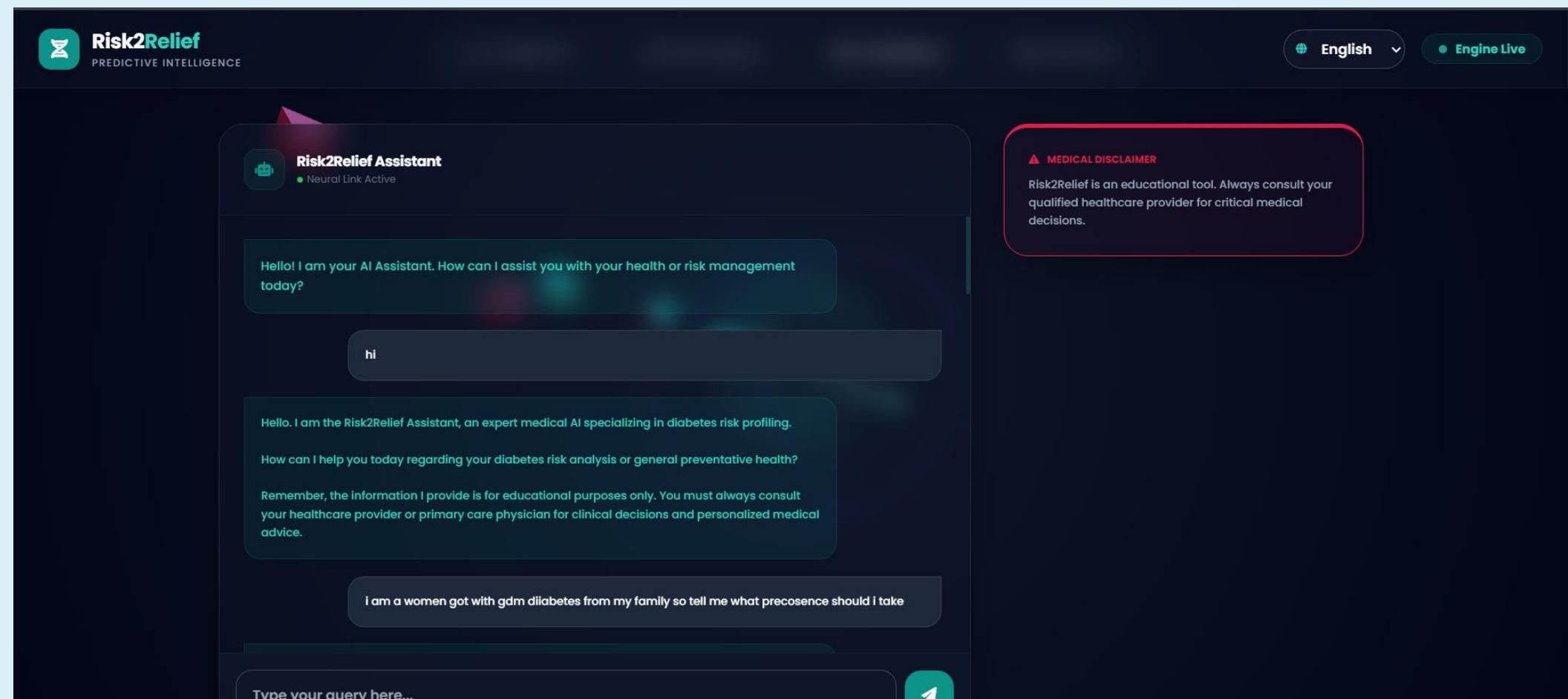
EXPLORE CONCEPTS



4

EXPLORE CONCEPTS

3 EXPLORE CONCEPTS



MINIMUM VIABLE PRODUCT

PLATFORM PREVIEW



 Risk2Relief
PREDICTIVE INTELLIGENCE

English Engine Live

Dashboard Risk Analysis AI Assistant Pop. Stats

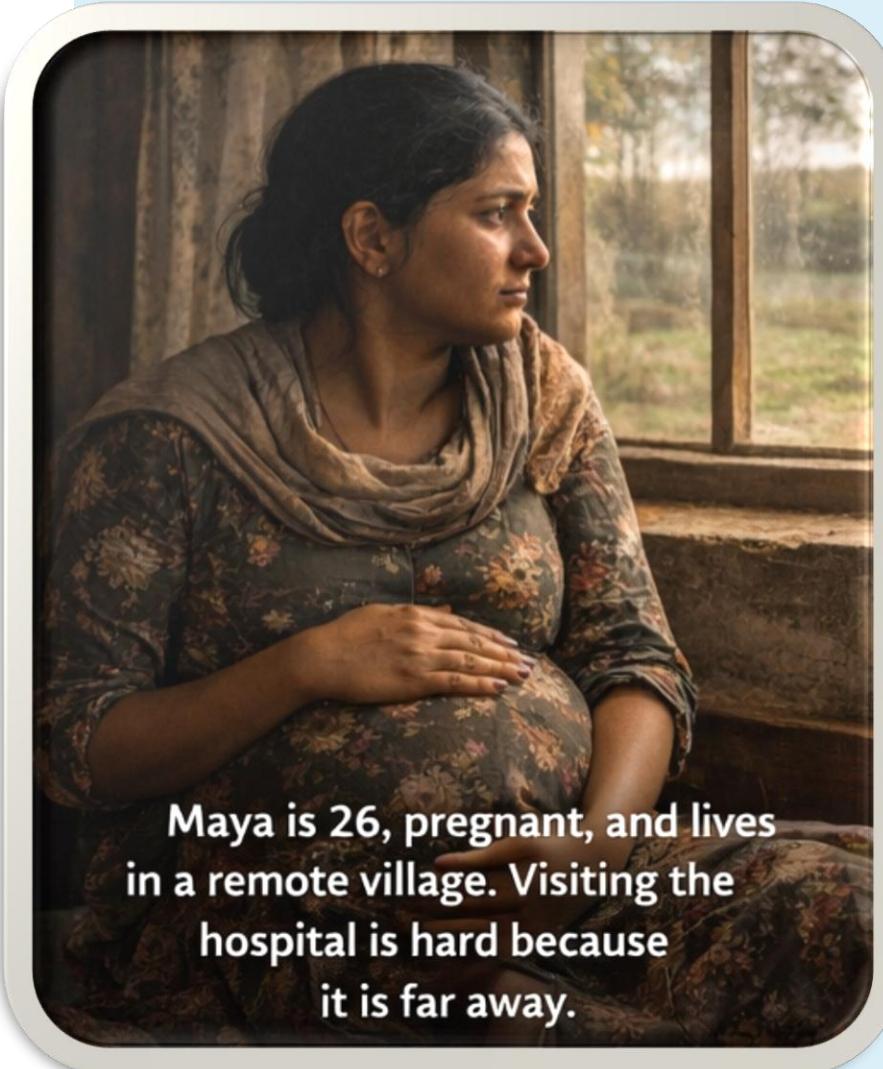
Population Neural Map

Aggregate global clinical datasets to visualize predictive health trends.

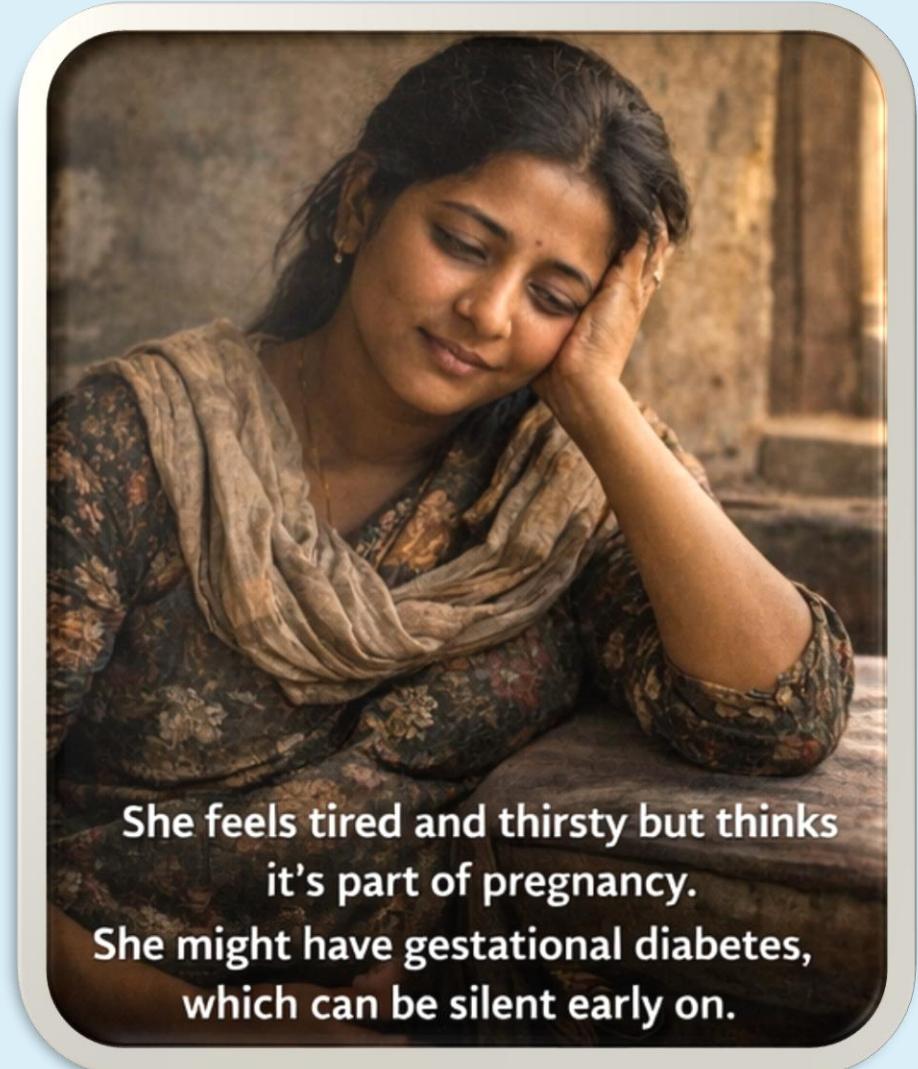
 UPLOAD CLINICAL DATASET
CSV, JSON or XML Clinical Files



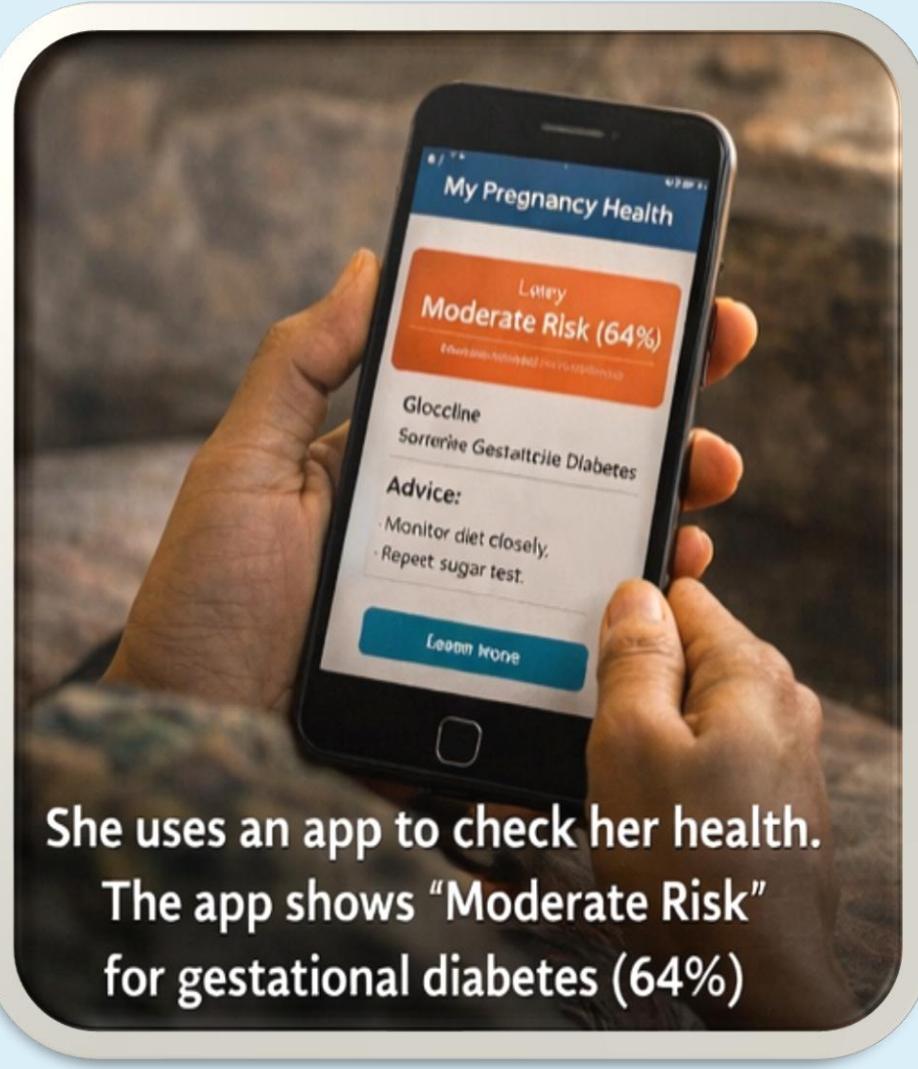
EXPLORE CONCEPTS



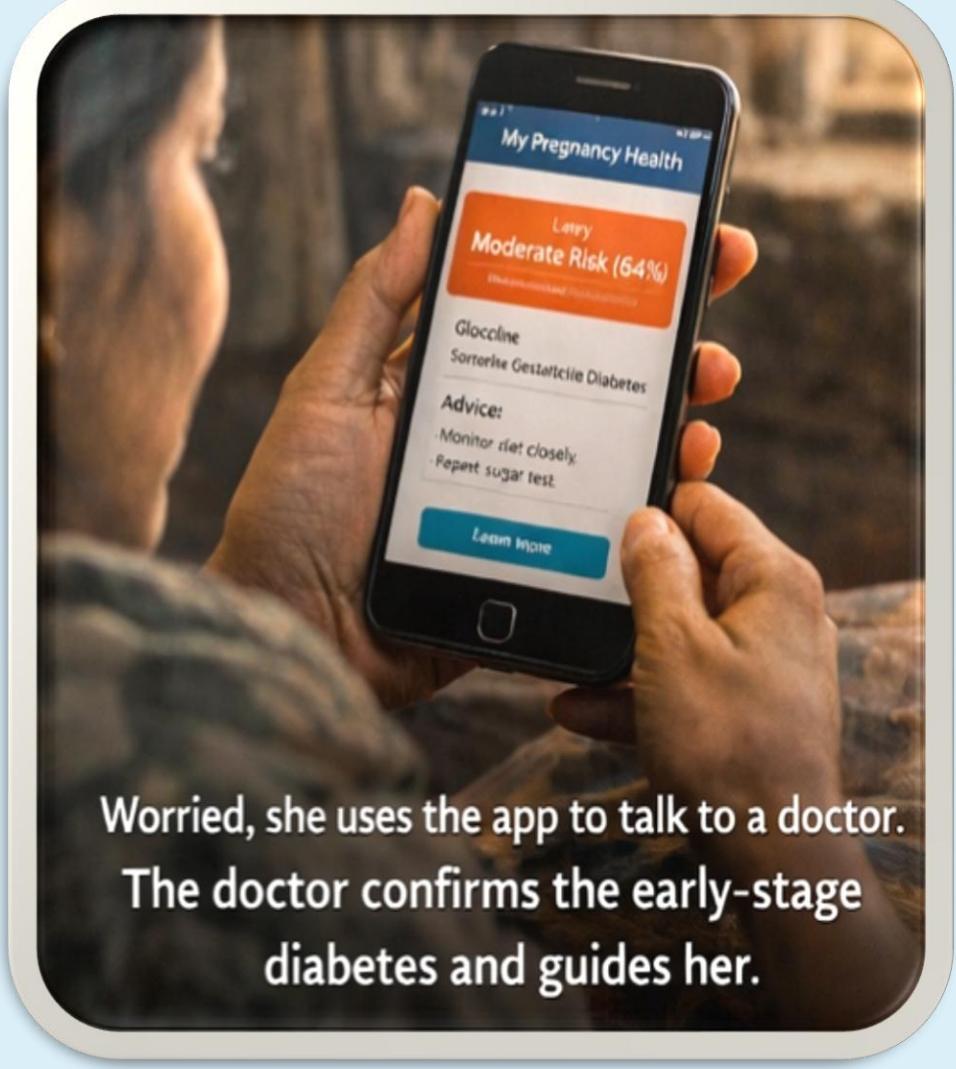
Maya is 26, pregnant, and lives in a remote village. Visiting the hospital is hard because it is far away.



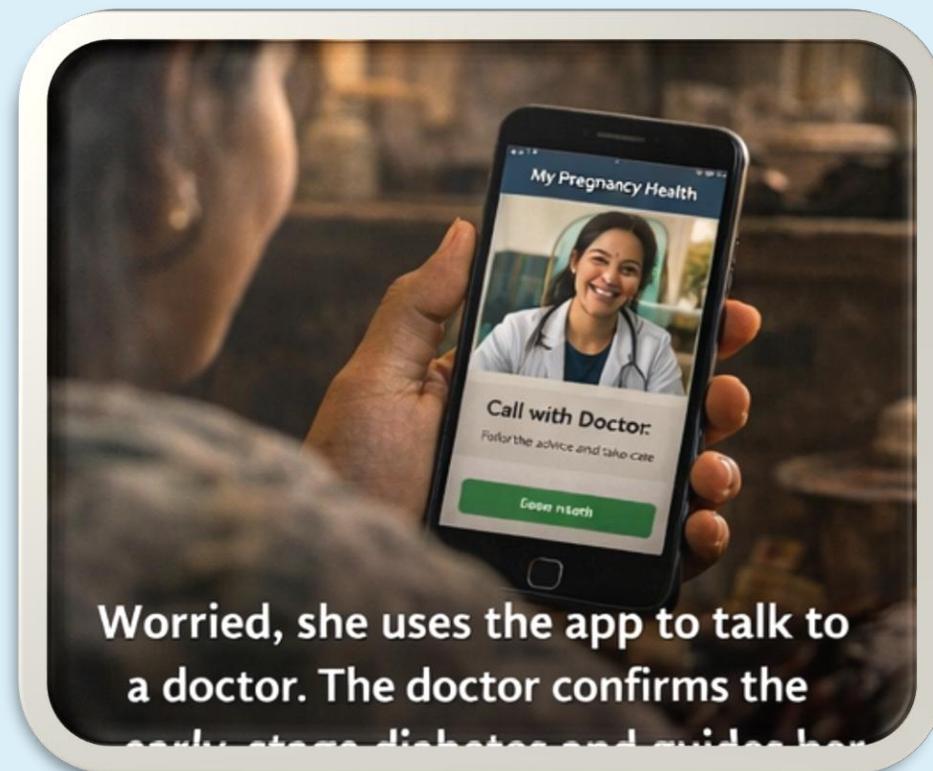
She feels tired and thirsty but thinks it's part of pregnancy. She might have gestational diabetes, which can be silent early on.



She uses an app to check her health. The app shows "Moderate Risk" for gestational diabetes (64%)

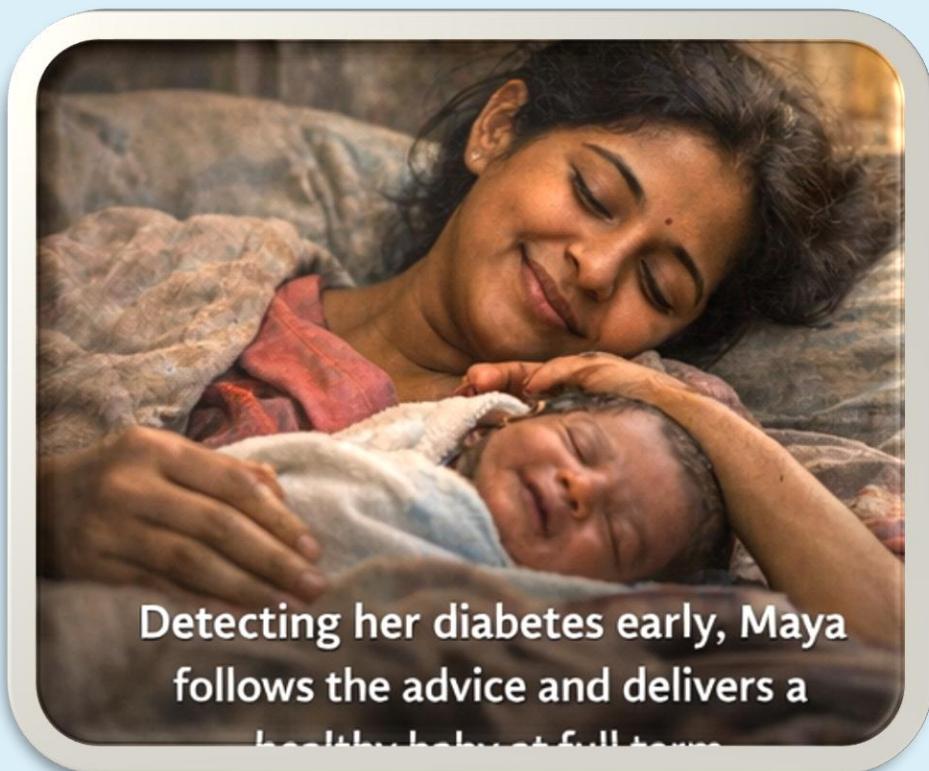


Worried, she uses the app to talk to a doctor. The doctor confirms the early-stage diabetes and guides her.



Worried, she uses the app to talk to a doctor. The doctor confirms the early-stage diabetes and guides her.

USE CASES THE STORY



Detecting her diabetes early, Maya follows the advice and delivers a healthy baby at full term.

WHAT WE OFFER

- **Predictive Intelligence:** A molecular engine that analyzes baseline data to generate personalized health insights.
- **Clinical Risk Profiling:** Specialized analysis to detect low, moderate, or high risk for conditions like diabetes.
- **Preventative Guidance:** Expert-level medical suggestions and precautions based on individual bio-data.
- **Centralized Patient Management:** A unified dashboard to track total patients analyzed and high-risk cases.

OUR FEATURES

Core Features

- **Advanced Dashboard:** Real-time tracking of **Risk Evaluations**, **Critical Alerts**, and **Safety Scores** compared to global averages.
- **Bio-Data Processing:** In-depth analysis of clinical metrics like Glucose, BMI, Blood Pressure, and Insulin levels.
- **Clinical History Tracking:** Visual "History Over Time" graphs to monitor health trends across several months.
- **AI Assistant:** A "Neural Link Active" chatbot for expert medical consultations on risk analysis and preventative care.
- **Population Analytics:** A **Population Neural Map** to aggregate global datasets (CSV, JSON, or XML) for visualizing health trends.
- **Required Report Integration:** Automated prompts for essential tests like **HbA1c**, **Lipid Profiles**, and **KFT**.

CUSTOMER VALUE PROPOSITION



- **For Healthcare Providers:** It offers a high-speed analytical tool to monitor patient populations, identify high-risk cases instantly, and track longitudinal health trends through visual data mapping.
- **For Patients:** It provides personalised risk transparency, enabling individuals to understand their health trajectory and receive tailored preventative suggestions.
- **For Organizations:** It enables large-scale population health analysis by aggregating global clinical datasets to visualise and predict broader disease trends.

OUR PRODUCT

- 1. Predictive Logic Engine** (Classical & ANN Streams, Simulated Quantum Path)
- 2. Comprehensive Analysis Dashboard** (Risk Evaluation & Safety Scores, History Over Time, Required Clinical Reports)
- 3. Intelligent Interaction & Reporting** (Risk2Relief AI Assistant, Population Neural Map, Daily Health Pulse)

COMPETITIVE ANALYSIS

Comparison Feature	Traditional Clinical Care	Basic Glucose Apps	Standard Telehealth	Wearable Sensors (CGM)	Our Solution
Real-Time Data Sync	✗	✓	✓	✓	✓
Automated Clinical Triage	✗	✗	✗	✗	✓
Early Risk Prediction	✗	✗	✗	✗	✓
Remote Patient Monitoring	✗	✓	✓	✓	✓
Postpartum Follow-up	✗	✗	✗	✗	✓
Low-Cost Accessibility	✓	✓	✗	✗	✓
Unified System for Clinics	✗	✗	✓	✗	✓

THE TEAM

Team Shudarshana. Our mission is to combine technical innovation with rigorous research to provide a clear, data-driven vision for diabetes management. Inspired by the precision of the Sudarshana, we cut through complex data to deliver meaningful health solutions and awareness."



Uttej Moturu

Team Leader



Kasi Viswanath Vegisetti

Tech Developer



Agraharapu Haripriya

UI Developer



Dasari Tarun Kumar

Literature Reviewer

The Anchor: Responsible for overall project coordination, timeline management, and ensuring that every team member's work aligns with the project's goal of diabetes education and analysis.

The Engine: manages the technical implementation, including any data processing, algorithmic analysis, or coding required to transform raw health data into usable insights.

The Bridge: Focuses on the "Vision" (Darshana) aspect of our name. She translates complex technical results into a user-friendly and visually engaging interface, making the information accessible to everyone.

The Foundation: Conducts deep-dive research into medical journals, news reports, and academic papers. He ensures the project is built on a foundation of verified facts regarding diabetes trends, risks, and management strategies.

Thank You!