Pregoway: Predictive Maternal Health System

Blueprint Document v1.1

Executive Summary

Pregoway is not a pregnancy tracker—it's a predictive maternal mortality prevention system powered by adaptive AI. While existing apps track appointments, Pregoway predicts complications 2-4 weeks before they become life-threatening and dynamically adjusts the pregnancy journey to prevent maternal and infant deaths.

The Problem: 45,000 Indian women die annually during pregnancy. 60% of these deaths are predictable but currently go undetected until emergency situations arise.

Our Solution: An AI system that learns from daily patient interactions, analyzes patterns invisible to human observation, and intervenes before complications become fatal.

Market Gap: No existing system combines predictive analytics, adaptive journey planning, and inclusive design for rural India.

Core Innovation: What Doesn't Exist Yet

1. Predictive Risk Engine (Not Reactive Tracking)

Current Systems: Track appointments, send reminders (reactive)

Pregoway: Predicts pre-eclampsia, gestational diabetes, hemorrhage risk, fetal distress 2-4 weeks before clinical diagnosis

How: AI analyzes micro-trends in blood reports, daily symptom patterns, vital sign velocities that doctors miss

Example: Patient reports "mild headache" 3 days in a row + BP rising 2mmHg weekly + slight hand swelling → AI flags 68% pre-eclampsia probability → Immediate intervention scheduled

2. Adaptive Journey Replanning (Dynamic Protocol Adjustment)

Current Systems: Fixed 9-month appointment schedule

Pregoway: Journey changes in real-time based on risk evolution

How: If gestational diabetes detected at Week 20 (vs standard Week 28 test), entire remaining journey auto-adjusts: adds dietician, extra scans, changes delivery hospital to NICU-equipped facility

Impact: Proactive management vs crisis response

3. Multi-Modal Pattern Recognition

Current Systems: Analyze single data points (BP reading, glucose level)

Pregoway: Combines 15+ data streams to detect danger patterns

Data Sources:

- Lab report trends (velocity of change, not just values)
- Daily symptom progression
- Sleep quality patterns
- Fetal movement changes
- Weight gain acceleration
- Voice stress biomarkers (future)
- Medication adherence
- Even weather/season (heat stress correlation)

Example: Individual symptoms seem minor, but combination triggers alert: fatigue + reduced fetal movement + pale complexion in photos = anemia + possible fetal distress

4. Rural India-First Design (Truly Inclusive)

Current Systems: English-only, assume typed digital reports, require constant internet

Pregoway Innovations:

- **Handwritten Report Input:** Take photo of doctor's handwritten prescription/report → AI extracts data in 12+ Indian languages
- **Manual Data Entry:** Family member can input data if patient is illiterate
- **Voice-First Interface:** Answer questions by speaking in Hindi/Tamil/Bengali/Telugu/Marathi/Gujarati
- **Offline-First Architecture:** All features work without internet, sync when available
- **SMS Fallback:** Critical alerts via SMS if no app access
- **Shared Device Model:** One family device can manage multiple pregnancies
- **Low Data Consumption:** < 5MB monthly data usage

5. Intelligent Document Locker with Auto-Extraction

Current Systems: Store PDFs, require manual reading

Pregoway:

- **Smart OCR:** Extracts values from lab reports (typed or handwritten) in any Indian language
- **Auto-Trending:** Tracks hemoglobin, BP, glucose, thyroid across all reports automatically
- **Visual Alerts:** "Your hemoglobin dropped 15% in 2 weeks" with graph
- **Doctor Comparison:** Highlights abnormal values with color coding
- **Family Sharing:** Controlled access for husband/mother to view reports

6. Daily Adaptive Questionnaire (Gets Smarter)

Current Systems: Fixed daily questions for all users

Pregoway: AI asks different questions based on individual risk profile

How It Adapts:

- Low-risk patient: 5 basic questions (sleep, fetal movement, energy)
- High-risk patient: 12 targeted questions (vision changes, swelling severity, headache location)
- Questions change based on yesterday's answers
- If patient reports new symptom, follow-up questions appear next day
- Compliance Gamification: Streaks, badges, weekly summary for motivation

7. Predictive Alerts (Before Crisis Happens)

Current Systems: Alert after problem occurs (reactive)

Pregoway: Warns 2-7 days before symptoms worsen

Examples:

- "Based on your BP trend, you might experience severe headaches by Friday. We've scheduled urgent check-up tomorrow."
- "Your baby's movement pattern has shifted. This could indicate distress. Do kick count test now."
- "Hemoglobin dropping rapidly. Expect extreme fatigue this weekend. Iron supplements prescribed."

8. Doctor AI Co-Pilot Dashboard

Current Systems: Doctors read reports manually

Pregoway: AI highlights critical patterns, suggests interventions

Features:

- **Risk Summary:** "Patient X - 67% pre-eclampsia probability based on 14-day trend"
- **Automated Flags:** "Urgent: Fetal movement reduced 40% in 3 days"
- **Treatment Suggestions:** "Consider prescribing aspirin to reduce pre-eclampsia risk (evidence-based)"
- **Compliance Tracking:** "Patient missed 3 medications this week - intervention needed"
- **Outcome Prediction:** "If current trajectory continues, C-section recommended by Week 37"

9. Family Caregiver Network Integration

Current Systems: Only patient gets information

Pregoway: Involves support system proactively

Features:

- **Husband/Mother Dashboard:** Simplified view of patient status
- **Task Assignments:** "Ensure she takes iron tablet after lunch today"
- **Emergency Protocols:** "If she reports these 3 symptoms, take her to hospital immediately"
- **Appointment Reminders:** Family gets reminders to arrange transportation
- **Risk Escalation:** "Her risk score increased - watch for warning signs"

10. Hyperlocal Hospital Routing

Current Systems: Patient chooses hospital

Pregoway: AI recommends hospital based on risk + capability

How:

- Low-risk pregnancy → Nearby clinic adequate
- High-risk (twins, pre-eclampsia) → Routes to hospital with NICU, blood bank, specialist
- Emergency mode → Finds nearest facility with ICU bed availability in real-time
- Considers: Distance, traffic, hospital equipment, doctor availability

Feature Breakdown: What We're Building

Phase 1: MVP (Hackathon Demo)

Core Features:

1. **Secure Document Vault**
    - Upload reports (PDF/photo)
    - OCR extraction (English + Hindi)
    - Manual data entry option
    - Trend visualization
2. **Daily Health Check-In**
    - 5-7 questions daily
    - Voice input option (Hindi/English)
    - Photo uploads (swelling, discharge)
    - Mood tracking
3. **Basic Risk Scoring**
    - Algorithm analyzes: lab values, symptoms, week of pregnancy
    - Risk categories: Green/Yellow/Orange/Red
    - Updates every 24 hours
4. **Journey Timeline**

- Visual calendar of appointments
- Doctor visits, tests, vaccinations
- Educational content per week

5. **WhatsApp Integration**
    - Daily reminders
    - Appointment notifications
    - Critical alerts

Demo Capabilities:

- Show risk prediction accuracy with historical data
- Demonstrate journey replanning when risk detected
- Display multi-language support
- Prove handwritten report OCR extraction

Phase 2: Advanced Intelligence (Post-Hackathon)

Enhanced Features:

1. **Predictive Analytics Engine**
    - Train on 10,000+ pregnancy outcomes
    - Predict: pre-eclampsia, gestational diabetes, hemorrhage, preterm labor
    - Accuracy target: 80%+ with 2-4 week lead time
2. **Adaptive Questionnaire AI**
    - Questions personalized per patient risk
    - Natural language processing for text answers
    - Sentiment analysis for mental health screening
3. **Multi-Language Expansion**
    - Support 12 Indian languages (Hindi, Bengali, Telugu, Marathi, Tamil, Gujarati, Urdu, Kannada, Odia, Malayalam, Punjabi, Assamese)
    - Voice input/output in all languages
    - Handwritten report OCR in regional languages
4. **Offline-First Architecture**
    - All features work without internet
    - Smart sync when connectivity available
    - <5MB monthly data usage
    - SMS fallback for zero-data scenarios

5. **Wearable Integration**
    - Connect BP monitors, glucose meters, pulse oximeters
    - Auto-import readings
    - Continuous monitoring for high-risk patients
6. **Telemedicine Integration**
    - Video consultation with doctors
    - Share reports during call
    - AI generates consultation summary
7. **Community Health Worker Portal**
    - ASHA workers can input data for patients
    - Bulk patient monitoring
    - Village-level health dashboard

Phase 3: Ecosystem Play (6-12 Months)

1. **Hospital EMR Integration**
    - Bidirectional data flow with hospital systems
    - Auto-import test results
    - Discharge summary extraction
2. **Insurance Integration**
    - Auto-claim filing for deliveries
    - Preventive care coverage tracking
    - Cashless delivery coordination
3. **Pharmacy Network**
    - Medicine delivery coordination
    - Prescription refill reminders
    - Generic alternatives suggestions
4. **Government Scheme Integration**
    - Auto-apply for PMMVY (maternity benefit)
    - Track Janani Suraksha Yojana payments
    - Link to Ayushman Bharat for cashless care
5. **Research Platform**
    - Anonymized data for maternal health research
    - Clinical trial matching
    - Outcome tracking for medical studies

Technical Architecture

Frontend Stack:

- **Web App:** React.js with Progressive Web App (PWA) capabilities
- **Responsive Design:** Mobile-first, works on all devices
- **Voice:** Web Speech API (multi-language)
- **Offline:** Service Workers + IndexedDB
- **UI Framework:** Material-UI / Tailwind CSS

Backend Stack:

- **API:** Python FastAPI (async, high-performance)
- **Database:** PostgreSQL (structured) + MongoDB (unstructured)
- **File Storage:** AWS S3 (encrypted)
- **Cache:** Redis (risk scores, real-time data)
- **Queue:** Celery + RabbitMQ (async tasks)

AI/ML Stack:

- **Risk Prediction:** XGBoost, Random Forest (interpretable models)
- **Time Series:** LSTM networks (trend analysis)
- **NLP:** BERT/Indic-BERT (text analysis in Indian languages)
- **Computer Vision:** ResNet/EfficientNet (ultrasound, photo analysis)
- **OCR:** Tesseract + custom-trained model for handwriting
- **Training:** TensorFlow/PyTorch
- **Deployment:** ONNX Runtime (optimized web inference)

Infrastructure:

- **Cloud:** AWS (scalable, HIPAA-compliant options)
- **CDN:** CloudFront (fast content delivery)
- **Monitoring:** Sentry + DataDog
- **Security:** AES-256 encryption, HIPAA/DISHA compliance

APIs & Integrations:

- **WhatsApp:** Business API for messaging
- **SMS:** Twilio for fallback alerts

- **Maps:** Google Maps API (hospital routing)
- **Translation:** Google Translate API (12 languages)
- **Payment:** Razorpay (subscriptions, insurance)

Competitive Advantage: Why We're Different

Feature	BabyChakra	Practo	Pregoway
Predictive Risk Scoring	❌	❌	✅ 2-4 week advance warning
Adaptive Journey Replanning	❌	❌	✅ Real-time protocol adjustment
Handwritten Report OCR	❌	❌	✅ 12 languages
Offline-First	❌	❌	✅ Full functionality
Rural-Focused Design	❌	❌	✅ Voice + SMS + low data
Family Caregiver Integration	❌	❌	✅ Multi-stakeholder alerts
AI Doctor Co-Pilot	❌	Partial	✅ Clinical decision support
Daily Pattern Recognition	❌	❌	✅ Multi-modal AI

None of our competitors predict outcomes. They only track inputs.

Impact Metrics (What Success Looks Like)

Year 1 Goals:

- 100,000 pregnancies managed
- 80%+ risk prediction accuracy
- 50% reduction in preventable complications among users
- 95% daily check-in compliance
- Presence in 100 hospitals across 10 states

Year 3 Vision:

- 5 million pregnancies managed
- 10,000 maternal deaths prevented (vs expected outcomes)
- Partnership with National Health Mission
- Published research in peer-reviewed journals
- Expansion to other maternal-child health areas

Measurable Outcomes:

- **Maternal Mortality Reduction:** Track deaths among users vs national average
- **Complication Detection Lead Time:** Days between AI alert and clinical diagnosis
- **Hospital Admission Optimization:** Reduction in emergency admissions, increase in planned interventions
- **Cost Savings:** Reduced ICU stays, fewer emergency C-sections
- **Patient Satisfaction:** NPS score, retention rate

Go-To-Market Strategy

Phase 1: Hospital Partnerships (B2B)

- Partner with 10-20 maternity hospitals
- Offer free pilot for 6 months
- Prove outcome improvements
- Revenue model: ₹200-500 per pregnancy (hospital pays)

Phase 2: Direct to Consumer (B2C)

- Freemium model: Basic tracking free, predictive features ₹999 for 9 months
- Target: Urban educated women initially
- Marketing: Content on pregnancy complications, testimonials
- Growth: Referral program (refer friend, both get 1 month free)

Phase 3: Government Integration (B2G)

- Pilot with state governments (Maharashtra, Karnataka)
- Position as PMMVY digital platform
- Scale to national program
- Revenue: Per-user licensing to government

Phase 4: Insurance Model

- Partner with health insurance companies
- Reduce their maternal claim costs
- Insurance covers subscription for policyholders
- Revenue: Per-user fee from insurer

Monetization Model

Revenue Streams:

1. **Hospital Subscriptions:** ₹300-500 per pregnancy managed
2. **Patient Subscriptions:** ₹999 for 9-month premium access
3. **Government Contracts:** ₹50-100 per beneficiary annually
4. **Insurance Partnerships:** ₹200-300 per insured pregnancy
5. **Data Licensing:** Anonymized research data to pharma/research institutions
6. **Telemedicine Commissions:** 20% of consultation fees

Unit Economics (Year 2):

- **Customer Acquisition Cost:** ₹500 (hospital) / ₹200 (direct)
- **Lifetime Value:** ₹2,500 per pregnancy
- **Gross Margin:** 70%
- **Payback Period:** 2 months

Regulatory & Compliance

Medical Device Classification:

- Applying for Class B Medical Device (CDSCO, India)
- Software as Medical Device (SaMD) approval process
- Timeline: 12-18 months for full approval

Data Privacy:

- **DISHA Compliance:** Digital Information Security in Healthcare Act
- **HIPAA Equivalent:** International standards for global expansion
- End-to-end encryption
- Patient data ownership and portability
- Right to delete data

Clinical Validation:

- Prospective clinical trial with 1,000 patients
- Compare outcomes: Pregoway users vs standard care
- Publish results in peer-reviewed journal
- Use for marketing credibility

Research Roadmap

Research Questions:

1. **Can AI predict pre-eclampsia 2-4 weeks before clinical diagnosis with 80%+ accuracy?**
    - Study design: Retrospective analysis of 10,000 pregnancies
    - Primary endpoint: Sensitivity, specificity, lead time
2. **Does daily symptom tracking improve outcome prediction vs lab-only approach?**
    - Study design: Compare two AI models (with vs without daily data)
    - Hypothesis: Multi-modal model improves accuracy by 15%+
3. **What is the impact of adaptive journey planning on maternal mortality?**
    - Study design: RCT with 2,000 participants (intervention vs control)
    - Primary endpoint: Maternal mortality and severe morbidity rates
4. **Can voice biomarkers predict perinatal depression?**
    - Study design: Record daily voice check-ins, correlate with depression screening scores
    - Novelty: First Indian study on voice + maternal mental health

Publication Strategy:

- **Target journals:** The Lancet Digital Health, JAMA Network Open, PLOS Medicine
- **Goal:** 3-4 papers in Year 1-2
- **Impact:** Credibility for hospital sales, government partnerships

Team Requirements

Founding Team:

- **CEO:** Healthcare/tech background, fundraising experience
- **CTO:** ML/AI expert, built scalable systems
- **Chief Medical Officer:** OB-GYN, research credentials
- **Head of Product:** Maternal health domain expertise

Early Hires (0-6 months):

- 2 Full-stack developers (React + Python)
- 1 ML Engineer (model development)
- 1 Data Scientist (research)
- 1 Designer (UX for low-literacy users)
- 1 Hospital Partnership Manager

Advisors:

- Maternal health expert (AIIMS/top hospital)
- AI ethics expert
- Government health policy advisor
- VC with health-tech portfolio

Funding Requirements

Seed Round (₹3-5 Crore):

- **Product Development:** ₹1.5 Cr (team, infrastructure)
- **Clinical Data Collection:** ₹75 L (hospital partnerships, data acquisition)
- **Regulatory:** ₹50 L (CDSCO approval, legal)
- **Marketing & Pilots:** ₹1 Cr (hospital pilots, initial user acquisition)
- **Operations:** ₹25 L (6-month runway)

Series A (₹20-30 Crore) - 18 months:

- **Scale Engineering:** ₹5 Cr (team expansion, infrastructure)
- **Clinical Trials:** ₹3 Cr (RCT for validation)
- **Sales & Marketing:** ₹10 Cr (B2B sales team, digital marketing)
- **Geographic Expansion:** ₹5 Cr (new states, languages)
- **Working Capital:** ₹5 Cr

Risk Analysis & Mitigation

Risk 1: AI Prediction Accuracy

Risk: Model predictions are wrong, leading to false alarms or missed cases

Mitigation:

- Conservative thresholds (prefer false positives over false negatives)
- Human-in-loop for all RED alerts
- Continuous model retraining
- Clear disclaimers: AI assists, doesn't replace doctors

Risk 2: Regulatory Delays

Risk: CDSCO approval takes 24+ months

Mitigation:

- Launch as "wellness app" initially (not medical device)
- Parallel regulatory process
- Partnerships with approved hospital systems

Risk 3: Hospital Adoption Resistance

Risk: Doctors skeptical of AI, hospitals slow to change

Mitigation:

- Position as "doctor assistant," not replacement
- Prove ROI with pilot data
- KOL endorsements from respected OB-GYNs

Risk 4: Data Privacy Breach

Risk: Sensitive health data leaked

Mitigation:

- Bank-grade encryption
- Regular security audits
- Cyber insurance
- Minimal data retention

Risk 5: Patient Non-Compliance

Risk: Patients don't answer daily questions

Mitigation:

- Gamification (streaks, rewards)
- Family involvement (reminders from husband/mother)
- Simplify to <2 minutes daily
- WhatsApp integration (where they already are)

Success Stories (Projected Scenarios)

Scenario 1: Pre-Eclampsia Prevention

Patient: Priya, 28, first pregnancy, Week 24

AI Detection: BP rising trend + protein in urine + mild headaches = 72% pre-eclampsia risk

Intervention: Doctor prescribes aspirin, schedules weekly monitoring, plans early delivery at equipped hospital

Outcome: Controlled pre-eclampsia, baby delivered healthy at Week 37 via planned C-section

vs Standard Care: Without early detection, emergency C-section at Week 32, NICU admission, higher costs

Scenario 2: Gestational Diabetes Caught Early

Patient: Anjali, 32, overweight, family history of diabetes, Week 18

AI Detection: Weight gain velocity + fatigue pattern + thirst increase = 68% GDM probability

Intervention: Early glucose test (instead of Week 28), diet modification, glucose monitoring

Outcome: Controlled GDM, normal delivery, healthy baby

vs Standard Care: Undiagnosed until Week 28, baby macrosomia (large), emergency C-section

Scenario 3: Rural Access Success

Patient: Lakshmi, 22, village in Bihar, limited smartphone access, illiterate

Solution: ASHA worker uses shared tablet, inputs Lakshmi's handwritten reports via photo OCR

AI Detection: Severe anemia detected from pale conjunctiva in photo + fatigue reports

Intervention: Iron infusion arranged, blood transfusion readiness at district hospital

Outcome: Anemia corrected before delivery, safe birth

vs Standard Care: Anemia undetected, hemorrhage during delivery, maternal death

Conclusion: Why Pregoway Will Win

Pregoway is not incremental innovation—it's a paradigm shift.

We're moving maternal healthcare from:

- Reactive → Predictive
- Tracking → Preventing
- One-size-fits-all → Personalized
- Urban-only → Inclusive
- Doctor-dependent → AI-augmented

The market is massive: 26 million pregnancies annually in India alone.

The impact is measurable: We can directly attribute lives saved.

The moat is defensible: Clinical validation + proprietary dataset + regulatory approval = 3-5 year lead.

The timing is perfect: AI capabilities just reached reliability threshold, smartphone penetration hitting rural India, government digitizing healthcare.

This is the future of maternal healthcare. Pregoway makes it reality today.

Contact & Next Steps

For Hackathon Demo: Full MVP with risk prediction on historical data, multi-language support, handwritten OCR showcase

For Pilot Partners: 6-month free trial for hospitals, outcome tracking, co-published research

For Investors: Detailed financial model, clinical trial protocol, go-to-market plan

For Research Collaboration: Data partnership opportunities, co-authored papers

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Pregoway: Because every mother deserves to come home with her baby.

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Confidential: For hackathon judges, potential partners, and investors only