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Telangana AI Rising Grand Challenge

Adoption of AI-Based Solutions for High-Risk Pregnancy Prediction

Introduction

In Telangana, the healthcare system operates across three tiers—primary, secondary, and tertiary—with varying levels of care and resources. High-risk pregnancies, when missed, can lead to life-threatening emergencies, while unnecessary referrals can overwhelm higher-tier centers.

Challenges Identified

1. **Patient Awareness & Accessibility**
   - Many expectant mothers lack awareness of early warning signs for complications.
   - Transportation barriers or cultural norms may prevent patients from accessing better-equipped facilities, even when urgent care is needed.

Limitations Hindering Digital/AI Adoption

1. **Infrastructure & Resource Constraints:** Rural PHCs and ASHA workers may face intermittent power or poor connectivity, posing challenges to AI deployment.

Proposed Technological Solutions

1. **AI-Based Risk Prediction Model**
   - **Classification Approach:** The core solution should employ a classification model (e.g., high-risk vs. low-risk) with a clear High-Risk Score or probability. Emphasis should be on minimizing missed high-risk cases (false negatives).
   - **Data Integration:** While the base model must utilize state-provided maternal data, startups are encouraged to incorporate additional relevant data (e.g., nutrition, socio-economic factors) to enhance predictive accuracy and contextual insights.

2. **Referral Guidance & Decision Support**

- Integrate clinical guidelines for automated triage, prompting referrals (e.g., "Refer to CHC/District Hospital") or local management.
- Provide real-time alerts for CHCs, district hospitals, or tertiary centers when certain risk thresholds are met.

3. **Mobile/Tablet Application Interface**
   - Develop a lightweight app allowing CHCs, district hospitals, or tertiary centers to input patient details at the point of care.
   - Enable offline functionality for data entry in low-connectivity areas, with syncing capabilities once networks are restored.

4. **Telemedicine & Specialist Support**
   - Facilitate virtual consultations with obstetricians at CHCs, district hospitals, or tertiary centers when an AI-detected high-risk case requires escalation.
   - Empower local teams with remote expert guidance for more confident referral decisions.

Proposed Methodology

1. **AI Model Development & Training**
   - Employ machine learning or deep learning on reliable, well-structured maternal health datasets, focusing on classification models that reliably separate high-risk from low-risk cases.
   - Evaluate models based on accuracy, precision, recall, and F1 score, prioritizing recall to ensure critical cases are not missed.

2. **Pilot Deployment at Selected Rural CHCs, District Hospitals and Tertiary Centers in Telangana**
   - Introduce the solution in phased pilots at the healthcare centers with adequate patient inflow and trained workers.
   - Assess user experience, including ease of data entry and clarity of AI-generated risk predictions.
   - Compare referral outcomes against historical benchmarks to measure effectiveness.

3. **Integration & Scale-Up**
   - Develop API integrations to process MCH data at T+1 intervals and perform scoring.
   - Link the AI model's dashboard with existing digital health platforms across Telangana.
   - Provide workflow training for CHC, and healthcare staff on interpreting AI-based risk scores.
   - Establish clear escalation protocols leveraging AI outputs to guide referrals.

4. **Monitoring & Continuous Improvement**
   - Gather regular feedback from frontline workers on usability and acceptance.

- Track key maternal-fetal outcomes (maternal mortality, neonatal mortality, referral rates) to evaluate success.

5. **Regulatory & Ethical Compliance**
   - Adhere to patient privacy laws and guidelines to ensure data confidentiality.
   - Implement role-based access for sensitive health records.
   - Maintain audit logs of data entries and AI decisions to enhance transparency and accountability.