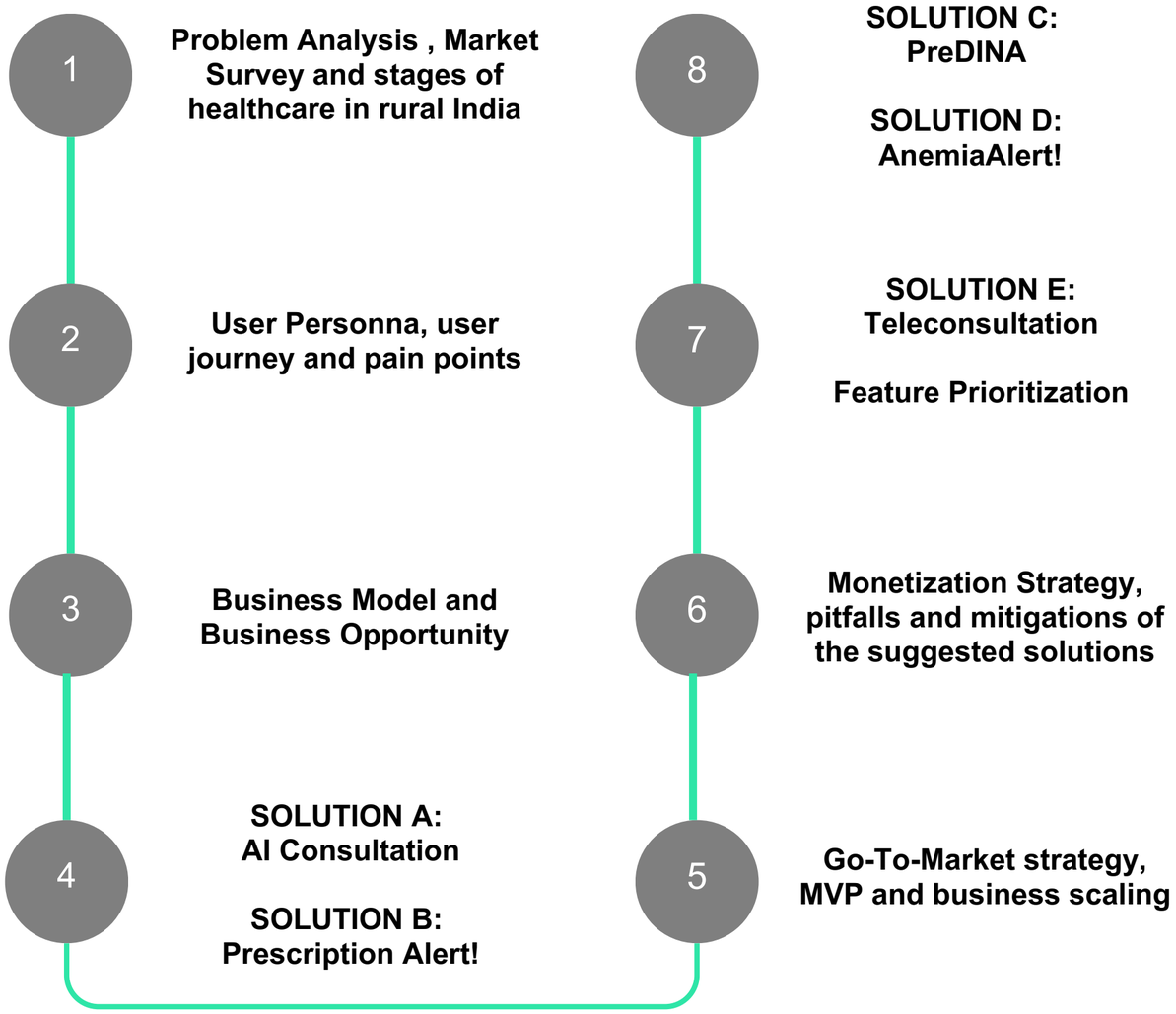
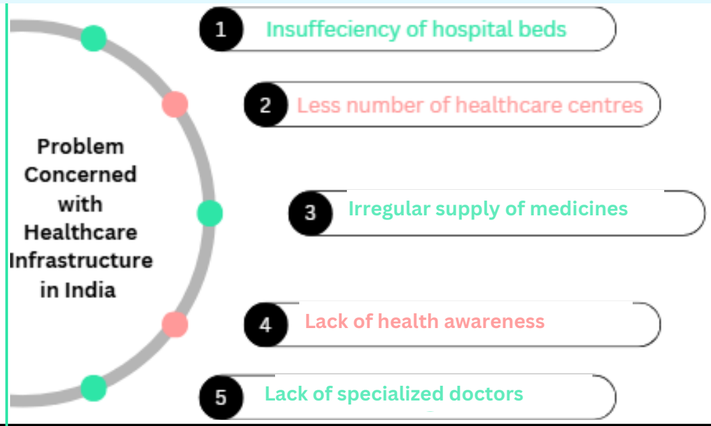
# Solving for the last-mile healthcare challenges in Rural India

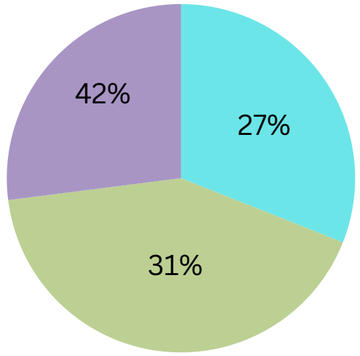


| | |
|---|---|
| **75%** | **of health infrastructure and resources are concentrated in urban areas, where only 27% population resides** |
| **70%** | **of population has no access to specialist care as 80% of specialists live in urban areas.** |
| **30%** | **of Primary Health Centers (PHCs) in rural India operate without a doctor, and 63% have only one or no paramedical staff** |
| **122** | **Indians per 100,000 die due to poor care quality each year, making India's death rate worse than even its neighbour Pakistan** |

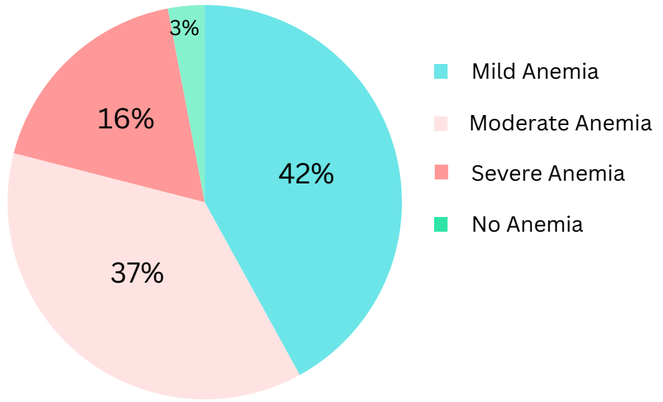



**Percentage shortfall in health infrastructure in rural India**




| Category | Number in rural areas | WHO Expected Number |
|---|---|---|
| Doctor to Patient Ratio | 1:1,667 | 1:1,000 |
| Infant Mortality Rate | 37 | Higher than urban area, lying in severe category |
| Maternal Mortality Rate | 145 | Higher than urban area, lying in disturbing category |
| Hospital Bed Avaliability | 3.2 per 10,000 | 5 per 10,000 |
| PHCs | 1 PHC per 30,000 population | Shortfall of over 30% PHCs |
| Ambulance Services | 1 ambulance per 100,000 population | Limited Availability |




**Sample size** NFHS-3: 124,385 NFHS-4 : 699,686

| | Full Antenatal Care | Skill Attendant at Birth | Postnatal Care |
|---|---|---|---|
| NFHS-3 | 21,360 | 32,072 | 22,323 |
| NFHS-4 | 138,945 | 198,116 | 142,983 |

Postpartum period (PPP), ranging from childbirth to 6 weeks, is the most crucial time for the survival and well-being of the newborn and the mother. During this period, postpartum anemia (PPA) is a frequently observed omplication, and a critical factor for maternal morbidity and mortality.

## Stages of Healthcare & its Condition in Rural India

| | Awareness | Considerations | Consultation | Treatment | Post Treatment |
|---|---|---|---|---|---|
| Patient Activities | People in rural areas often recognize health issues based on **advice from family** and neighbors. Many rely on home remedies for initial care due to a **lack of awareness** about healthcare services. | Individuals weigh the need to seek professional healthcare against challenges such as **long distances,** transportation costs. Often, healthcare is delayed until the condition worsens, as basic **symptoms are overlooked**. | When health conditions escalate, people visit the nearest hospital, often facing extended **waiting periods**. Many receive inconsistent diagnoses or basic treatments due to **limited resources** and **overcrowded facilities.** | After consultation, patients are prescribed medication or advised treatment, but adherence is **inconsistent**. Patients often struggle with understanding the importance of **follow-ups** and managing **chronic illnesses** | Follow-up appointments are rare, and healthcare routines are **frequently neglected** due to the inconvenience of traveling again. Patients often miss essential health check-ups, and treatment . |
| Satisfactory Level | 😟 ●●○○○ | 😢 ●○○○○ | 😣 ●●○○○ | 😐 ●●●○○ | 🥺 ●●●○○ |
| Touchpoints | Minimal health education, absence of formal healthcare communication channels, and limited involvement of community health workers in spreading awareness. | **Poor accessibility** to nearby healthcare centers, financial constraints, and preference for **traditional remedies.** | Long travel distances, **understaffed PHCs**, lack of specialized care, and **outdated diagnostic tools**. | **Limited doctor-patient interaction**, **insufficient treatment explanations**, lack of access to necessary medication, and poor monitoring of treatment adherence. | No **digital health records** for tracking progress, **lack of reminders** for follow-ups, and **weak systems** for chronic disease management and long-term care. |



# Ram Prasad

45 | Farmer

Ram is a farmer living in a remote village. He works long hours in the fields and has been experiencing chronic back pain and symptoms of hypertension. His access to healthcare is limited as the nearest town hospital is hours away.

### User Journey

**Hesitates** to seek care due to cost, distance, and reliance on local remedies.

→ Delays in treatment worsen his condition.

→ Faces **long queues** and **limited diagnostic tools** at the PHC.

↓

Lacks a **medical history,** leading to inconsistent care.

← Struggles with **follow-up** due to work commitments and distance.

← **No reminders** or system for ongoing care, **delaying recovery.**

### Pain points:

- Difficulty in understanding treatment plans due to **low health literacy**, leading to **inconsistent medication** usage and follow-ups.
- **Limited transportation** and **long distances** to PHC prevent timely access to medical consultations.
- Lack of proper diagnostic tools in PHC leads to delays in identifying **non-communicable diseases** like diabetes and hypertension.



# Meena Devi

32 | Pregnant Woman

Meena is a homemaker and a new mother living in a rural area. She recently got pregnant and is going to give birth in some months. She ignores small symptoms because it took her a large travelling distance for nearest healthcare center.

### User Journey

Lack of pregnancy **awareness** and access to diagnostic tools leads to **delayed care.**

→ Inadequate **prenatal care** due to distance and limited health literacy increases **health risks.**

→ Long wait and **insufficient staff** prevent timely checkups and **anaemia detection**.

↓

**Delays** in seeking care and understaffed PHCs lead to **high-risk** childbirth situations.

← Absence of **postnatal care** guidance results in unmonitored recovery and newborn care.

← Untreated postpartum anaemia and **missed vaccinations** worsen health outcomes for child too.

### Pain points :

- Limited access to **routine checkups** and **prenatal supplements** due to unavailability of healthcare personnel in rural PHCs.
- Inadequate resources and **understaffed PHCs** result in high-risk labour and maternal complications.
- Lack of **post-pregnancy guidance**, including anaemia monitoring and **breastfeeding support**, impacting both mother and newborn health.




# Primary Health Center ( PHC's)

PHC (Primary Health Centre) refers to a **basic health care facility** that serves as the first point of contact between the community and the healthcare system in rural and semi-urban areas of India. PHCs are intended to provide accessible, affordable, and essential healthcare services to the population, especially in **underserved regions**.

### Pain points :

- **Shortage of medical supplies**, diagnostic equipment, and infrastructure hampers the PHC's ability to provide **comprehensive** healthcare.
- Understaffed with fewer doctors and trained nurses, leading to **overcrowded facilities** and long wait times for patients.
- Absence of **efficient health data systems** for patient records results in fragmented care and difficulty **tracking medical histories** for continuity of care.

## How are we going to solve this? (Business Model)

**AI Based SaaS Solution (MVP)**

**SaaS for PHC/ Healthcare centres** → **Registers Patients on it** → **Unique User ID/Code** → **App for Associated Patients**

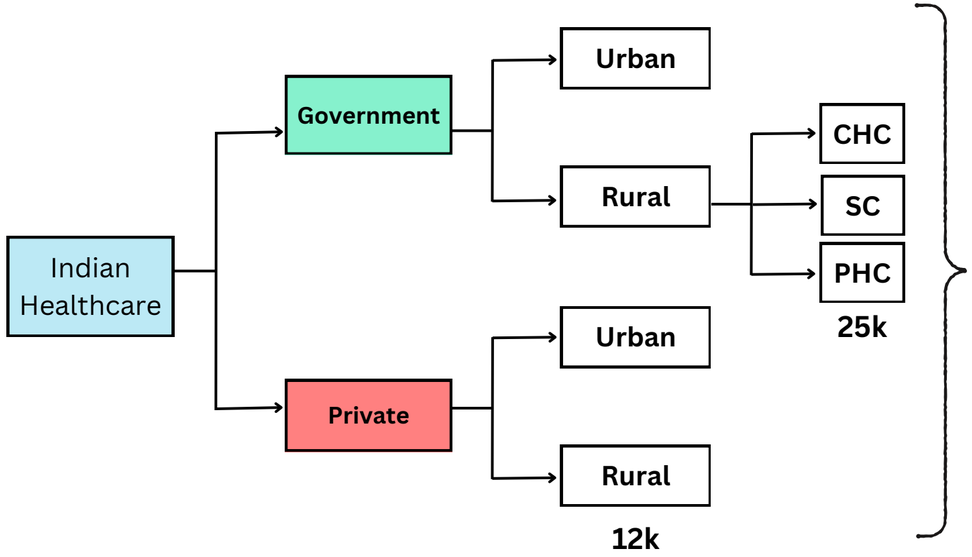
**Some Constant Features of App/ PHC's Saas**

- **Vernacular Language Support**
- **Speech Support**
- **Audio Explanation Support**

**Some Integrated Features for PHCs/Local healthcare center**

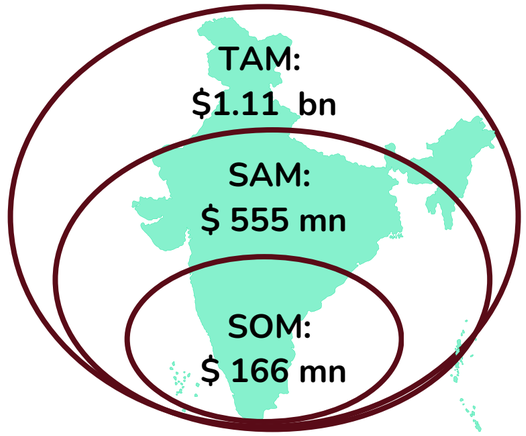
- **Patient Data Management System for SaaS**
  - **A Data management** and input feature for **PHC** to **manage Patient's PHC Dependent Features.**
- **Tele-based Appointment booking (Patient App)**
  - A Tele-Booking system for booking appointment in PHC avoiding long queues and reducing the hassle and increasing efficiency in PHCs/Local Hospitals

## Unfolding the Business Opportunity*:




37 K Centres **X** Average 10k Patient/ Centre

→ **Lives Impacted**: **370 million** X **ARPU**: **$3** (₹20-22/month) = **Business Opportunity**: **$ 1.11 Billion**



# SOLUTION A: AI Consultation

**A Bot that is interrogative in nature will zero in on issues to finally generate a response. It will cover patients' queries, from disease symptoms of NCDs to medicinal and general first-aid queries.**

Home Screen → AI Bot → Query through Voice → AI Clarifies and asks further → User Replies

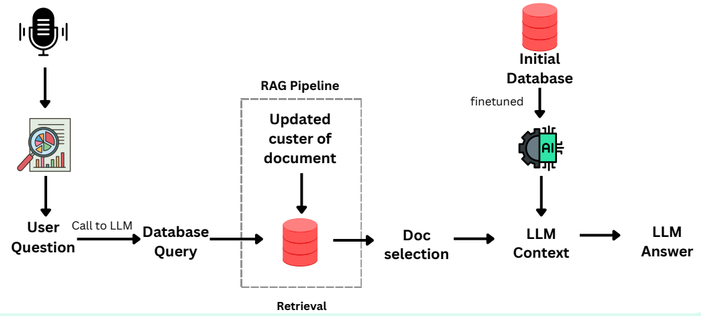
**Clear instructions are provided in both written and audio formats**

AI Clarifies and asks further → In case of a major disease detection it suggests to visit PHC

AI Clarifies and asks further → Bot Gives Information about probable disease




## TECHNICAL WORKING




## PAIN POINTS ADDRESSED

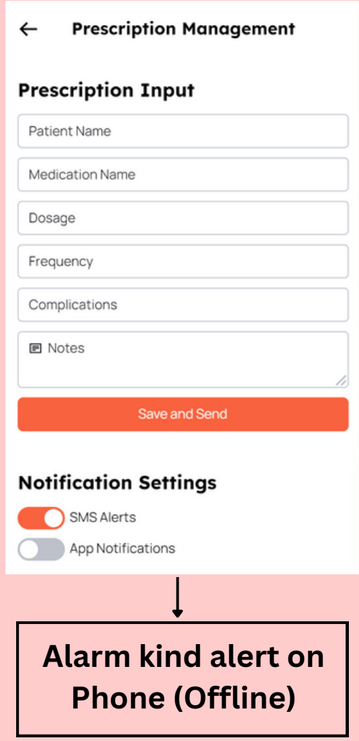
- The AI Bot allows patients to **interact with the system from their homes**, reducing the need for travel to PHCs. Patients can **query through voice**, making it **convenient to seek medical advice** without the burden of long distances.
- The chatbot provides **clear, personalized responses** based on user queries about **disease symptoms and treatment options**. It uses an **interrogative approach** to clarify symptoms and issues, ensuring that patients receive understandable information.
- If a **major disease is suspected**, it recommends **visiting a PHC**, ensuring that patients receive necessary care before conditions worsen.

# SOLUTION B: Prescription Alert!

**PHC can enter the prescription for Patient through SaaS which will be updated and Patient will get SMS (to tackle connectivity issues) and App Alert (Offline) at that time of day.**

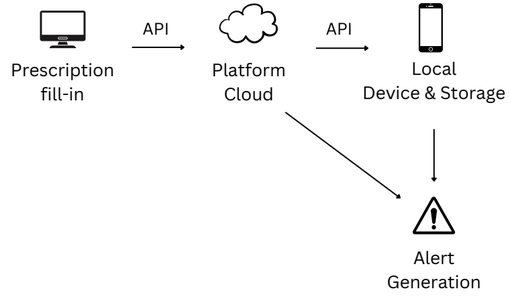
Patients Consulted → Staff inputs Prescription → Prescription is added to patitents App → Patient can select any time between the window → Patient gets Alerted Everytime

**Clear instructions are provided in both written and audio formats**




**Alarm kind alert on Phone (Offline)**

## TECHNICAL WORKING




## PAIN POINTS ADDRESSED

- To tackle connectivity challenges, patients receive **SMS alerts and app notifications** whenever their **prescriptions are updated**. This system ensures that patients stay informed about their treatment plans, regardless of their internet access.
- Patients can receive prescriptions **directly through the app**, eliminating the need for frequent visits to healthcare facilities.
- The SaaS platform allows healthcare providers to enter prescriptions directly, updating patients in real-time. This ensures **timely medication information**, even when local diagnostic tools are lacking.

# SOLUTION C: PreDINA

**Users can visit PHCs to record uterine electrical signals (EHG) during early pregnancy, and the AI-driven system analyzes these signals remotely to predict preterm labor risks. This analysis provides parameters of uterine contractions, enabling timely interventions to mitigate preterm delivery risks.**

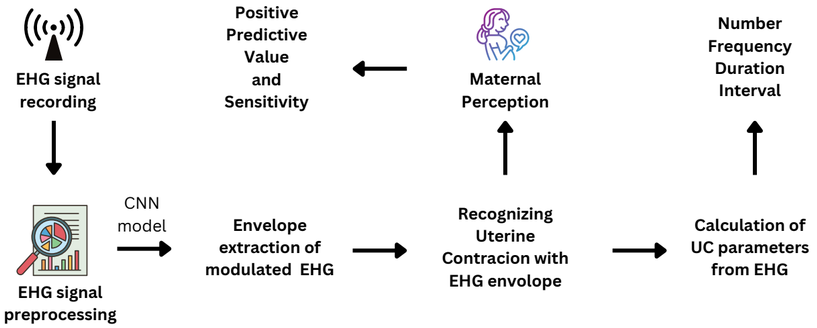
Home Screen → Find nearest PHC → Schedule Appointment → Visit Health Center → Capture EHG Signals

electrodes are placed on their abdomen to capture uterine electrical signals (EHG)

Capture EHG Signals → Real-time Data Analysis → Results → Follow-up Steps

Results will show
EHG Level
Contraction Frequency
Risk Status: Low Risk, Moderate Risk, or High Risk
and
Recommendations

## TECHNICAL WORKING




## PAIN POINTS ADDRESSED

- The app **analyzes EHG signals** remotely to **predict preterm labor risks**, offering parameters like **contraction frequency** and **risk status** (low, moderate, or high). This timely information allows for **early interventions**, potentially **reducing the incidence of complications during labor**.
- At the PHC, users can capture EHG signals, enabling healthcare providers to gather critical data **despite limited staffing**. The app's real-time data analysis helps optimize the use of available resources by providing **immediate insights** into uterine activity.

# SOLUTION D: AnemiaAlert!

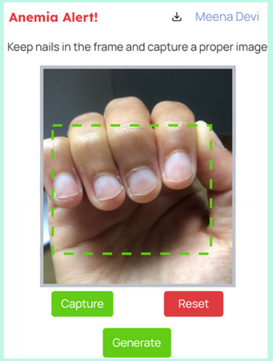
**Users can upload images of their fingernail bed taken with their smartphone cameras, and the app utilizes a multi-linear regression model to analyze the color data and metadata. This analysis estimates hemoglobin levels, determining whether they fall below the anemia threshold.**

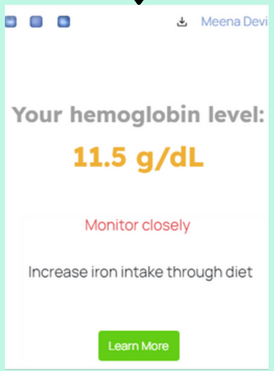
Home Screen → Capture Image → Upload Image → Results → Follow-up Steps

Clear instructions are provided in both written and audio formats

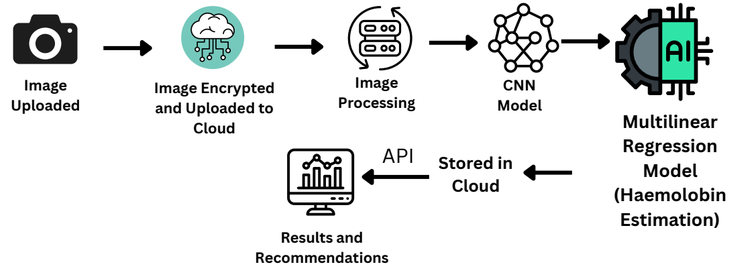
Navigate to Reports → View Previous Reports → Select a Report → Access Images

- **Normal (≥ 12 g/dL)**
  No immediate action needed
- **Mild Anemia (10-11.9 g/dL)**
  Monitor closely and increase iron intake through diet (Examples)
- **Severe Anemia (<10 g/dL)**
  Immediate medical evaluation required, consult a nearby PHC




## TECHNICAL WORKING




## PAIN POINTS ADDRESSED

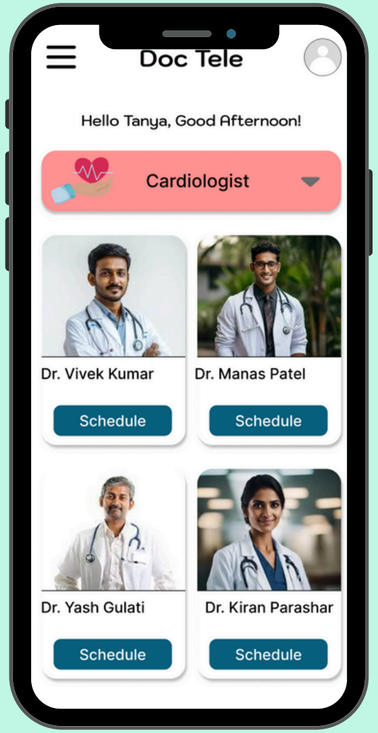
- By providing a user-friendly platform for anemia detection, the app **mitigates the impact of understaffed PHC**s. Women can receive **timely health assessments remotely**, decreasing the likelihood of complications that arise from **inadequate prenatal care**.
- The app offers **follow-up steps** based on the results of the hemoglobin analysis, including **guidance on anemia management and breastfeeding support**. This addresses the gap in post-pregnancy care and helps improve health outcomes for both mothers and newborns.

# SOLUTION E: Teleconsultation

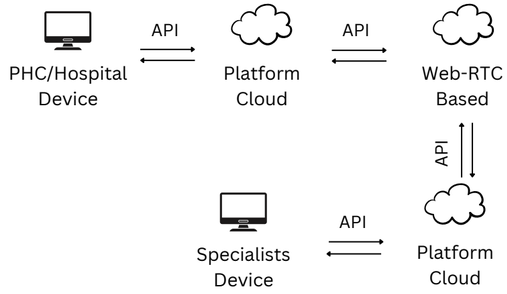
**It is a system for PHCs/Hospitals/Patients to arrange for patients to have calls/discussions with specialists as there is a lack of specialized staff at PHCs/Local Hospitals**

Patient needs specialised consultation → HC/Patient asks to schedule consultation with specialised doctor → Patients Receives the time for teleconsultation

- Patient visits HC for teleconsultation with the specialis
- Patient attends the consultation on their device




## TECHNICAL WORKING




## PAIN POINTS ADDESSED

- The system allows healthcare providers or patients to **schedule consultations** with **specialized doctors** without the **need for extensive travel**. Patients receive a **designated time** for teleconsultation, enabling them to access **specialized medical advice from the comfort of their homes or local health centers**.
- During the teleconsultation, specialists can **explain treatment plans** directly to patients, using **clear language and visual aids** if necessary. This real-time interaction helps improve health literacy, ensuring **patients understand their conditions and medication regimens**.

# WHICH PAIN-POINTS SHOULD WE FIRST SOLVE IN MVP?*

| Parameter/ Solutions | AI Consult. (A) | Prescription Alert! (B) | PreDINA (C) | Anemia Alert (D) | Tele-consult. (E) |
|---|---|---|---|---|---|
| Patients[1] Reached | ▲▲▲▲ | ▲▲▲ | ▲▲▲ | ▲▲▲ | ▲▲▲ |
| Impact on[2] Patient | ▲▲▲ | ▲▲ | ▲▲▲▲ | ▲▲▲▲ | ▲▲▲▲ |
| Effort[3] /Cost | ▲▲▲▲ | ▲▲ | ▲▲▲▲ | ▲▲▲ | ▲▲▲ |
| Probability[4] of Success | 80% | 75% | 75% | 85% | 90% |

## *Qualitative Analysis for Prioritisations

1. AI consult. is useful for everyone from home, Tele Consult. is pay-per-use so reach: **A > B = C = D = E**
2. Impact of Feature C & D is huge on women (target user) and E for patients seeking it so **C = D = E > A > B**
3. Effort involved in feature A & C are huge and B has significantly lower effort so **A = C > D = E > B**
4. Tele-consult. is somewhat has proven implementation than others so **E > D > A > B = A**

## Monetisation

**Subscription**

- AI Consultation Bot — preDINA
- Prescription Alert — AnemiaAlert

**Subscription for $2-$3 /year per patient**

**Pay-per-use**

- Teleconsultation

**per-use feed ($2-$3) (PHC/patient)**

### Scaling Monetisation

As we include more solutions we can put it up in **either category.**

As We we get reach we can have a **freemium model application**

| Features | Metrics | Potential Pitfalls | Mitigation |
|---|---|---|---|
| **AI Consultation bot** | ★ **Number of AI Queries done per patient per day** | Users may find the **interrogation process too lengthy** or **complicated**. | Simplify **the conversation flow** and **provide clear instructions**. Conduct **user testing** to refine the interaction |
| | **Consultation Completion Rate** | There is a risk of **incorrect** or **incomplete diagnoses**, especially for **complex** or rare **diseases**. | Implement a **fallback mechanism** to connect users with a healthcare professional if **the bot cannot resolve a query.** |
| | **Referral Rate (Patient percentage visiting PHC after)** | | |
| **Prescription Alert!** | ★ **Percentage of patients Adheing to Prescriptions** | **Over-notification** could cause patients to **ignore** or turn off alerts. | **Personalize notifications** based on patient preferences and treatment schedules. Allow users to **customize alert**s. |
| | **Percentage of patients missing prescriptions** | **Delivery Failures:** SMS alerts may not reach all patients due to network issues or incorrect contact information. | Implement a dual notification system (SMS and **in-app alerts** like clock) |
| | **CTR: Response to alert percentage** | | |
| **PreDINA** | ★ **Prediction Accuracy Rate** | Dynamic **data may be difficult to interpret** at rural PHCs without proper medical expertise. | Initial **training** to Staffs to operate this |
| | **Reduction in Preterm Complications** | Rural PHCs may **not have the infrastructure** to collect and analyze immune data effectively. | Partner with **Diagonastic labs** for kits to PHC at cheap |
| | **Early Intervention Rate** | | |
| **AnemiaAlert** | ★ **Accuracy of Hemoglobin Level Estimation** | **Inconsistent Image Quality:** Variability in image quality can lead to inaccurate assessments. | Provide **clear guidelines** on how to **take proper images** and **Incorporate** an **image quality check** before analysis. |
| | **% of users who upload images receiving prompts.** | **Misinterpretation of Results by Users**: Users may misinterpret the analysis results, leading to unnecessary panic regarding their health. | Provide detailed explanations, using simple language that is easy for users to understand or to contact PHC after results. |
| | **Follow-up Testing Rate** | | |
| **Teleconsultation** | ★ **Number of Teleconsultation done per PHC/Patient** | Many health conditions **require** a **physical examination**, limiting the effectiveness. | Encourage Teleconsult for initial diagnosis followed by visits. |
| | **Patient Satisfaction (CSAT colleced by PHC)** | Difficulty in **scheduling timely consultations** could **frustrate users** | Build **a network of specialists** willing to **provide consultations through the platform**. Implement an **efficient scheduling system** that **prioritizes urgent cases**. |
| | **No-Show Rate** | | |

## Validation & Regulation

### Pilot

Identify **2-3 rural PHCs** and private healthcare centers in diverse geographical areas to conduct pilot testing.

Measure KPIs such as **user engagement rates, consultation success rates**, and **patient satisfaction** scores to validate the product's effectiveness.

### Regulations to watch out for!

**Medical Devices:** Ensure AI tools and remote monitoring devices follow the Medical Devices Rules (2017) and receive approval from the CDSCO.

**Electronic Health Records (EHR):** EHR Standards for India (2016) for managing health records, ensuring data interoperability and security.

**Prescription Management:** Abide by Medical Council Regulations and the Pharmacy Act for electronic prescriptions and drug dispensation.

**PDPP Act:** Can not store medical data of users without consent

**Prescription Management:** Abide by Medical Council Regulations and the Pharmacy Act for electronic prescriptions and drug dispensation.

## Onboarding

### Government PHC

Develop a **targeted engagement strategy** for government PHCs by presenting data from the **pilot program** to demonstrate the benefits.

Select **initial states to target**, Convey the **platform's benefits** & **Work with the government** to improve efficiency.

### Private HC

Conduct **outreach campaigns** targeting private healthcare centers through emails, phone calls, and in-person visits.

Highlight **value proposition** and improved efficiency result to the HC Centre

### Training:

Organize training sessions for healthcare providers at government PHCs to familiarize them with the platform's features and benefits.

## Partnerships

### State/Central Government

**Partner with central & state government** to **roll-out SaaS** in PHCs across states and countries

### NGOs

Partner with **nonprofits** that focus on **rural health** (e.g., **CARE India**) to increase **grassroots reach**. They can assist with distributing the app and providing training..

### Local Government

Work with **local government bodies** to **organize community health camps** to showcase our product. This will serve as both a **marketing tool** and a means of gathering user **feedback**.

## Scaling

### Scaling MVP

Introduce more features for **diagnosis at PHC like PreDINA** to make it more effective

Use **insights** from pilot and **initial rollouts** to **refine existing features** and develop **new ones based on user needs**

### Scaling Business

I am looking for **more states** to make deals and **expand the network of PHCs and also Private HCs in rural India**.

Develop **a streamlined process** for **individual patients** to access the app **without direct association** with a **PHC**.

# Thank You!

# Appendix

## Problem Validation & Sources:

https://www.ima-india.org/ima/pdfdata/Issues-of-Rural-Health-By-Dr-A-Marthanda-Pillai.pptx#:~:text=India%20has%2019%20health%20workers,for%2025%20per%2010%2C000%20people.
https://pubmed.ncbi.nlm.nih.gov/12047509/
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4248476/
https://www.downtoearth.org.in/health/quality-of-care-must-for-better-health-outcomes-in-india-63009#:~:text=Almost%20122%20Indians%20per%20100%2C000,and%20Sri%20Lanka%20(51).

## Unlocking Business Opportunity & Strategt (Guesstimate & Sources)

https://pib.gov.in/PressReleasePage.aspx?PRID=1783809 (No. of PHCs)
https://isid.org.in/wp-content/uploads/2022/09/WP185.pdf (Private Sector)
Conservative Estimate (30% of Private HC in Rural India = 12 K)

https://www.linkedin.com/pulse/ppp-model-indias-need-healthcare-infrastructure-rajat-sarkar (Need of PPP Model in Healthcare Infrastructure)
SAM ( 50% of TAM) and SOM (30% of SAM)

## Others

https://www.pwc.com/us/en/industries/health-industries/library/ai-in-healthcare.html (PWC Report: AI in Healthcare)
https://www.healthcareexecutive.in/blog/harnessing-a#:~:text=Additionally%2C%20AI%2Ddriven%20virtual%20assistants,patient%20outcomes%20despite%20limited%20resources.
(Harnessing AI to Overcome Healthcare Barriers in Rural India)
https://www.medrxiv.org/content/10.1101/2024.07.30.24311228v1.full

## User Interview:

Doc

# Appendix

## Ai Consultation Bot

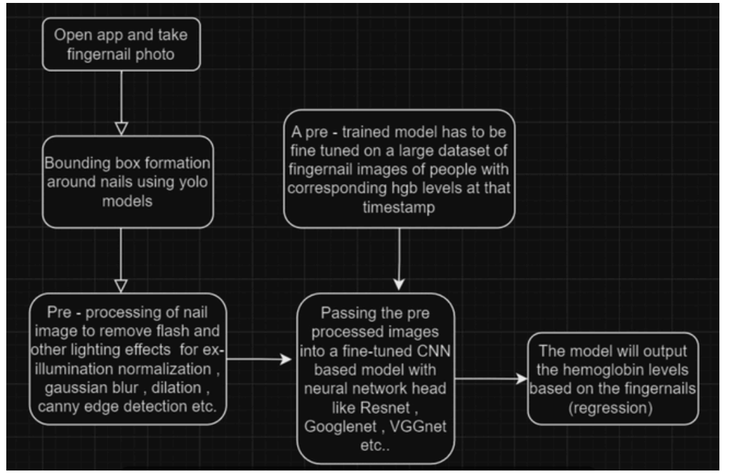
Link 1

Doc - Indetail

## Anemia Alert!

Link 1

Link 2




## PreDINA

Link 1

## Teleconsultation

Link 1