UNITE: *Smart, Connected, and Coordinated Maternal Care for Underserved Communities*

NSF Award CNS-1831918
Nikil Dutt, University of California at Irvine
IRG, FY2018

Principal Research Investigators (Name, Institution)

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Amir Rahmani,   University of California at Irvine

Community Partners (Name, Institution)

Pamela Pimentel,RN, Former CEO,
MOMS Orange County
Pat Patton, Former Chief Nursing Officer,
UCI Medical Center
Katie Skelton, Chief Nursing Officer,
St. Joseph Hospital of Orange
Kimberly Goll, CEO & Arlene Turner, Physical Activity
Specialist, *Children & Families Commission of*
Orange County
Georgina Maldonado, CEO,
Community Health Initiative of Orange County

UCI UNITE Project
Two Happy Hearts

Project Overview

Visual Schematic
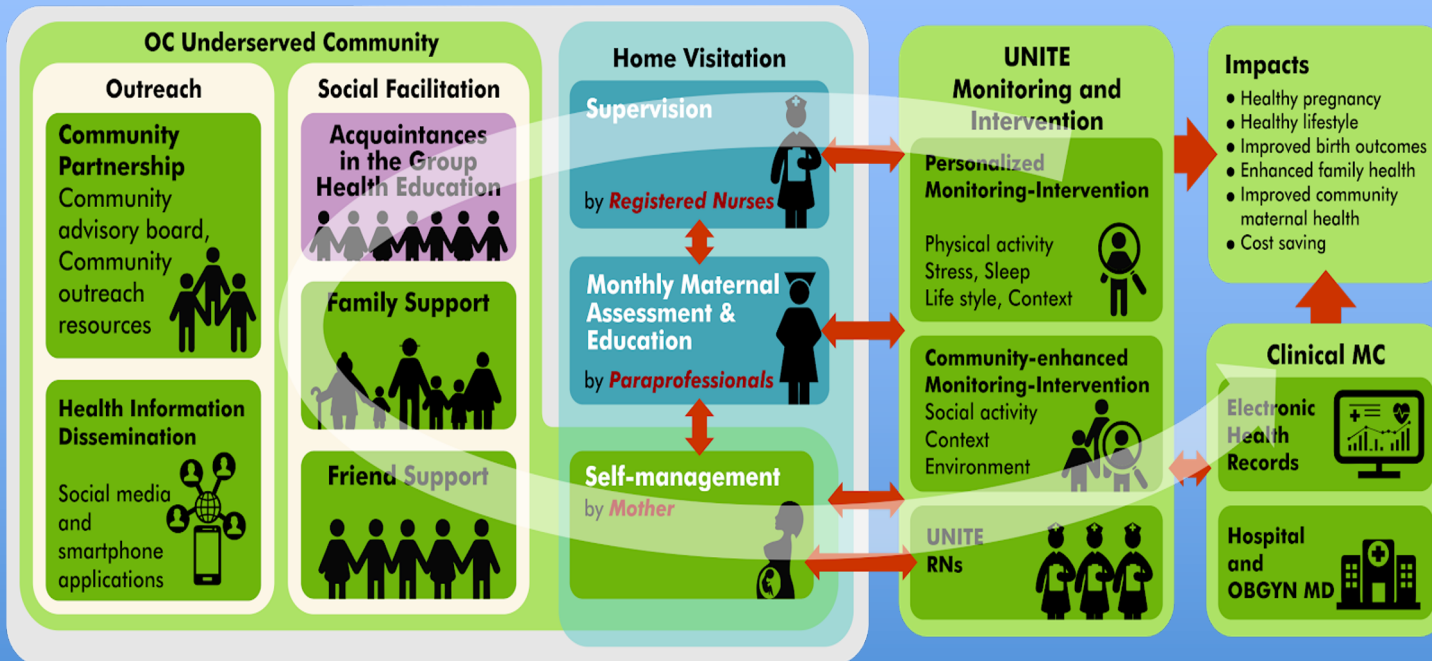
Project Vision

- Help underserved pregnant women achieve healthy pregnancies through IoT-enabled self-management and smart, personalized recommendations

- Enhance community engagement with mothers, families, & community-oriented agencies

Project Overview

Use-Inspired Research
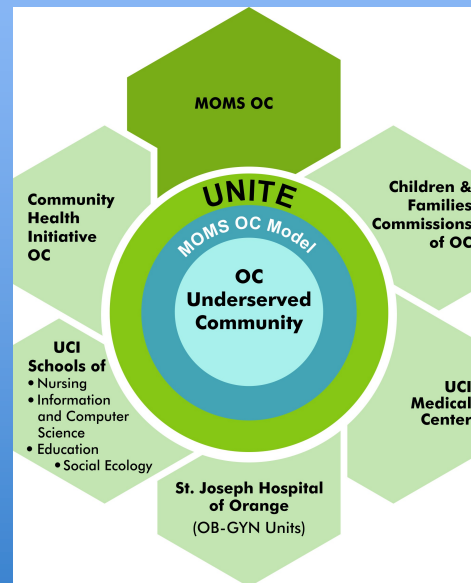
- **Problem**
  How to help underserved pregnant mothers achieve healthy pregnancies:
  Healthy Mothers, Healthy Babies, Healthy Communities!

- **Community Partner and Feedback from Moms**
  - Needs assessment survey w/ MOMS Orange County, CA
  - Case study with one pregnant mother
  - Ongoing feasibility study with pregnant moms

Community Partnership Model

Fundamental Research Contributions

- Motivate mothers to achieve healthy pregnancies through ubiquitous health monitoring, smart interventions, personalized recommendations and community-enhanced interaction and education.

- Build holistic digital phenotypes of the Maternal Care community using multi-modal data capture, personalized model building and dynamic recommendations (via wearable IoT devices, lifelogging, context recognition, health monitoring, and personalized, adaptive recommendation systems).

UCI UNITE Project Two Happy Hearts

Project Update

- **"Two Happy Hearts" (THH) Mobile App**
  - Mindful breathing and exercise regimen coached by community health workers
  - Aims to reduce the mother's stress level and achieve ACOG guidelines for physical activity during pregnancy.
  - THH app
    - Captures the emotional state of the mother through Ecological Momentary Assessment (EMA)
    - Motivates and guides mothers through the Two Happy Hearts breathing and exercise program
    - Enables personalized model building

- **Adoption by Children's and Families Commission of Orange County**
  - They have committed to adopting the Two Happy Hearts mobile app and exercise/breathing regimen after pilot testing in our project.

Two Happy Hearts Pilot Testing With Home Visitation Workers

Two Happy Hearts Mobile App
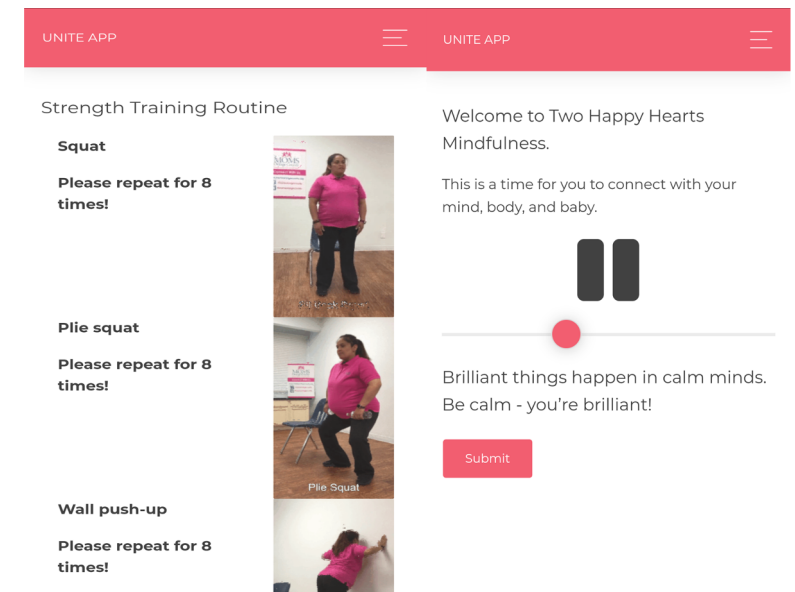
Project Evolution

Lessons learned from ongoing feasibility study for Two Happy Hearts (THH) deployment

We learned that underserved pregnant mothers have very limited time to deal with technological issues and multiple components of the project that may lead to sporadic THH use or even drop-offs. Furthermore, many pregnant mothers prefer exercise being introduced earlier in their pregnancy. Therefore, we need to devise schemes that incorporate THH earlier into their daily routines and personalize their use of THH components based on their individual needs and interests.

COVID-19 adaptation of THH: Indoor walking

Due to COVID-19 restrictions, we learned that pregnant mothers were hesitant to go outside their homes. We adapted the THH program for in-home use and also suggested indoor walking regimens. Furthermore, the THH app allows mothers to customize their THH regimen for their specific needs and preferences.


THH Home Aerobics
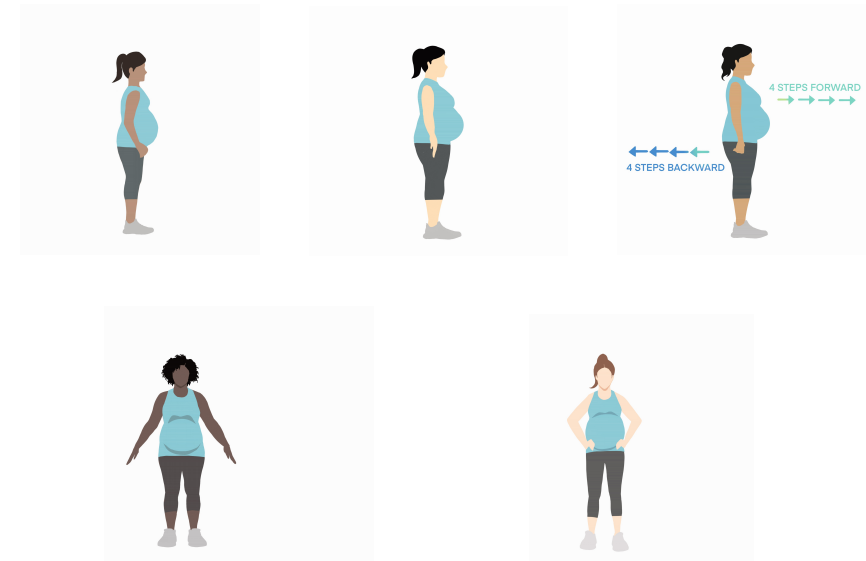
Evaluating Project Impact on Communities

We completed a case study of the Two Happy Hearts (THH) with one pregnant mother during April-June, 2020. This subject shared her successful delivery experience as well as provided valuable feedback on how to improve the app in July 2020.

"I gave birth to a beautiful baby girl on my due date naturally and with the Two Happy Hearts study I was able to prepare my body for its greatest achievement. I did squats during contractions and walked thousands of steps between them. I couldn't have done any of this without the program and probably would have opted for epidural had I not stayed so active."

Pamela Pimentel (Chair of our CAB) led the THH Community Outreach Training Session on Nov. 19, 2020, that sensititized the UNITE research team on community needs and best practices for community engagement.
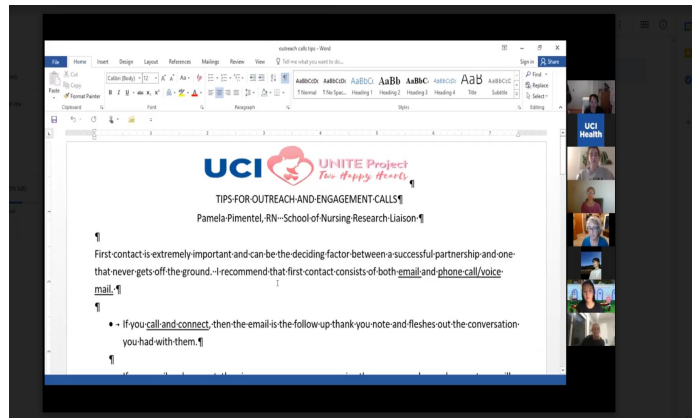
Pamela Pimentel

Anticipated outcomes & success measures for next year

- **Feasibility Study**
  - *Outcomes:* complete feasibility study and use outcomes to inform intervention, usability, and RCT study design.
  - *Success measures:* Prepare/submit IRBs for the next phase of the RCT.

- **UNITE technology components**
  - *Outcomes:* Modified THH exercise, breathing and relaxation module, the UNITE mobile app, and the dashboard
  - *Success measures:* THH app feedback and usage based on feasibility study outcomes

- **Expand Community Engagement**
  - *Outcomes:* support of the UNITE project from broader community (e.g., The Be Well OC Ecosystem) and develop closer relationship with direct service providers (e.g., OC Health Care Agency and South County Outreach)
  - *Success measures:* Additional CAB members from broader community and/or direct service providers
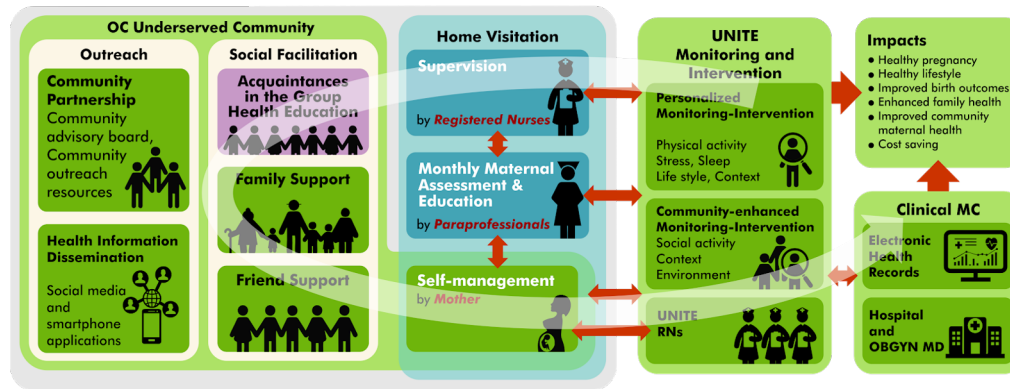
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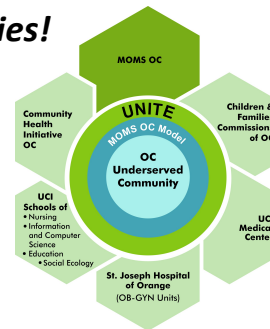
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