



# Using Artificial Intelligence to Save Babies' Lives: A Preterm Labour and Public Health Study

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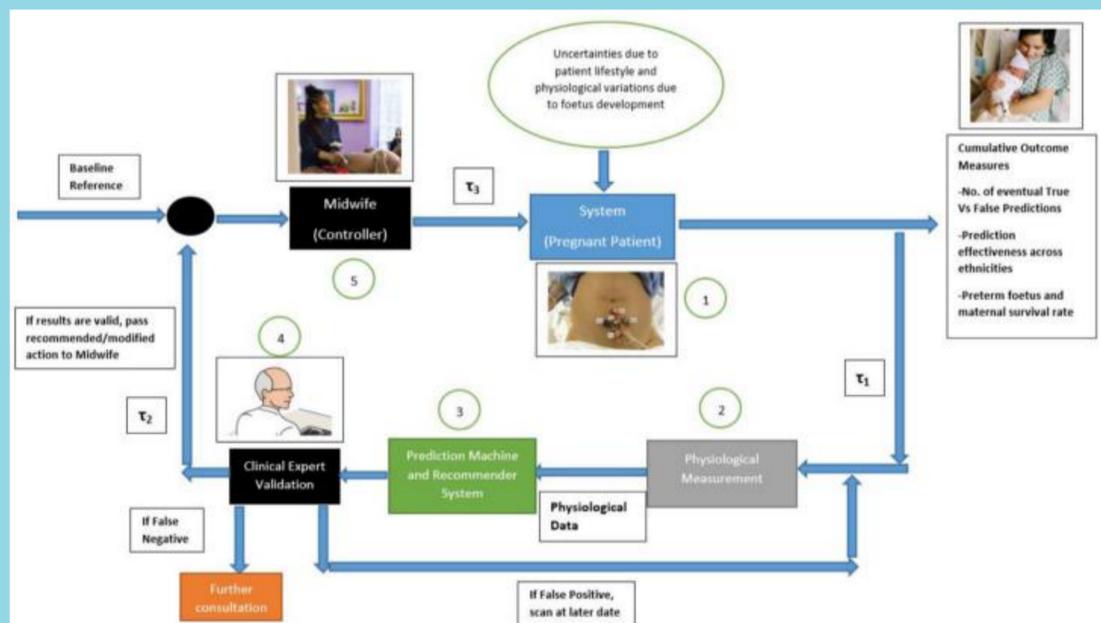
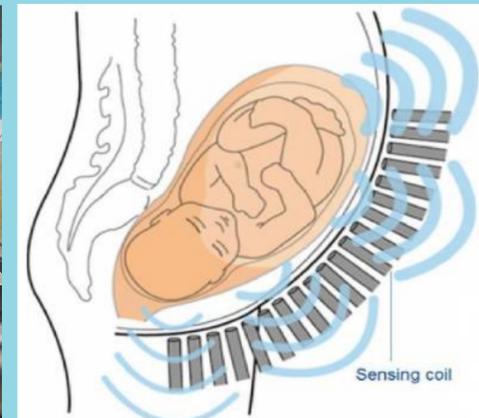
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## 1. The Problem

- Preterm Birth, the completion of a pregnancy before 37 weeks gestation, accounts for 35% of infant deaths below 5 years of age. This has been described as an epidemic by the World Health Organisation (WHO).
- The estimated cost of caring for a preterm infant in the UK is £65–95K, depending on the level of prematurity.
- Common observational means of predicting preterm births include cervical length measurements, biomarker analysis, and assessing the strength and frequency of uterine contractions. These methods are open to misinterpretation and error.
- There is evidence that gestational length varies between ethnicities, with neonates of African, Asian and Indian descent having higher rates of preterm birth, and increased morbidity and mortality.
- Preterm births are frequently exacerbated by social deprivation and socioeconomic factors.

## 2. A Proposed Solution: Combining Clinical Expertise and AI Prediction Machines

- Ethnicity-specific preterm prediction machines, utilising Artificial Intelligence (AI) and bio-electric uterine contraction signals, demonstrate improved accuracy in predicting birth imminency compared to traditional non-AI approaches.
- The AI prediction machine facilitates clinical interpretation by explaining the decisions made. It serves as a Decision Support Tool within a clinical cybernetic loop, including the validation of results by expert multi-disciplinary practitioners, while minimising potential false positives.
- AI is effective in predicting preterm birth, differentiating between ethnicities based on uterine contraction signals utilising supervised machine learning algorithms.
- Initial results have indicated that predicted birth imminency is enhanced by including ethnicity alongside existing standard clinical measures.
- With prediction accuracies spanning 80-90% depending on physiological instrumentation used.



## 3. Human & Financial Benefits

- Proactive, multidisciplinary care planning for improved pregnancy and neonatal outcomes.
- Applied AI can help to reduce infant mortality in developed and developing countries.
- Provision of personalised, ethnocentric care strategies reduce infant morbidity and mortality.
- Economic savings from unnecessary hospitalisation and inappropriate care.

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## 4. Future Work

- Collection of larger datasets comprising pregnant patients from diverse ethnic populations.
- The development of wearable electronics to facilitate continuous mobile monitoring of pregnant patients at various gestations throughout the 2<sup>nd</sup> & 3<sup>rd</sup> trimesters.
- Clinical pilot studies of the Human-Machine Cybernetic system.



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