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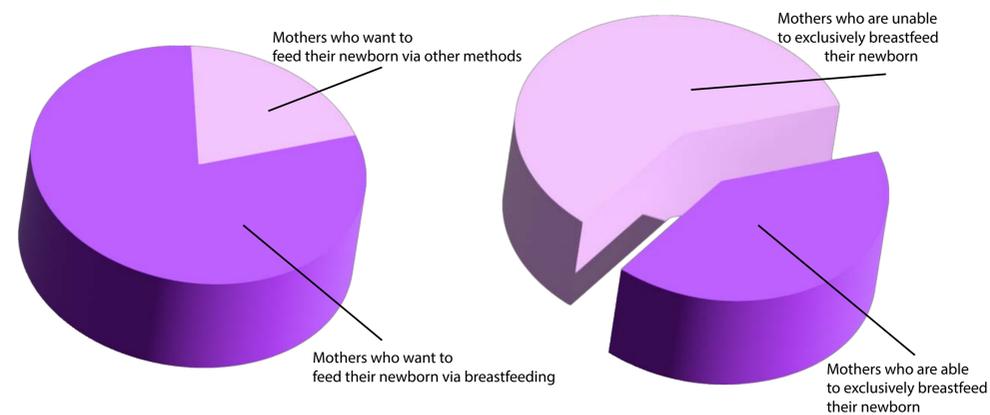
LactaLearn

Neonatal Feeding Monitoring

A special Thank you to our Committee Members:
Dr. Monique Solieau-Burke (The Pediatric Center - Columbia)
Dr. Elizabeth Logsdon (Johns Hopkins University)
Dr. Ann Faust (Baby and Me LLC)

Problem

Parents of exclusively breastfed newborns often face challenges in assessing whether their newborns are breastfeeding effectively and receiving adequate nutrition.



80% of new mothers want to exclusively breastfeed their baby for at least the first year of life

ONLY 41% meet this goal

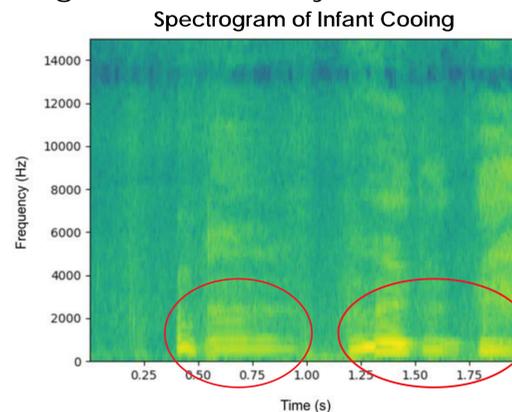
Source: Escobar et al., 2002

Unlike bottle feeding, where the volume of milk consumed can be easily measured, milk intake can not be directly gauged when breastfeeding. The primary method of determining breastfeeding effectiveness is tracking the baby's weight gain using a scale, however, accurate weight measurement of an infant requires extensive training and a high-precision scale, a device typically inaccessible in home settings.

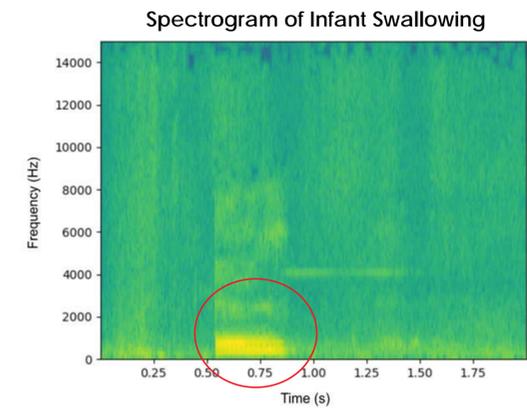
First time parents of exclusively breastfed newborns need a way to ensure that their newborn is adequately fed so that they can promote their baby's overall health and well-being.

Solution

This project aims to automatically track breastfeeding by detecting the presence and duration of audible swallows, as seen in the spectrograms. Each audible swallow indicates that milk is being consumed, so rhythmic swallowing shows consistent milk intake (Oddie, 2001). The application uses this tool and educational resources to inform the users of their infant's feeding success. Pictured below are spectrograms, which are visual representations of audio showing the intensity of frequencies across time. During a feeding session recording, the app turns the audio into spectrograms for a deep learning model to analyze.



The image above shows an example of a non swallow audio, in this case a baby cooing. The negative class includes various background sounds such as cooing, crying, and talking.



This image shows a swallow audio with a swallow around the 0.5 second mark.

The LactaLearn smart app works by monitoring an audio clip of a newborn during a breastfeeding session and returns to the user the duration of audible swallows. The app also includes a timer feature so mothers can record the length of each feeding session, and a resources page to gain knowledge on breastfeeding and newborn-related topics



The application includes (1) a home screen that allows users to navigate to the different tools in the application, (2) a resources page that allows users to find other information on breastfeeding, (3) an audio page where the user can record their breastfeeding session, and a results page where the user can receive feedback on the breastfeeding session.

References: Escobar, G. J., Gonzales, V., Mary Anne Armstrong, Folck, B. F., Xiong, B., & Newman, T. B. (2002). Rehospitalization for Neonatal Dehydration. Archives of Pediatrics & Adolescent Medicine, 156(2), 155-155. <https://doi.org/10.1001/archpedi.156.2.155>
Oddie, S. (2001). Hypermotric dehydration and breast feeding: a population study. Archives of Disease in Childhood, 85(4), 318-320. <https://doi.org/10.1136/adc.85.4.318>