Our study aims to test the reproducibility and repeatability of a training process and protocols by which non-medical personnel in rural and underserved areas worldwide can generate diagnostic quality ultrasound images to be uploaded and analyzed remotely to facilitate medical triage and improve maternal-fetal health outcomes. Our protocols, based-on external anatomical landmarks, will provide consistent, diagnostic quality ultrasound images of vital organs to identify critical medical conditions and pregnancy-related complications.

Evaluation of the images uses a two-pronged approach. First, a quality evaluation component using criteria modified from the American Institute of Ultrasound in Medicine (AIUM) accreditation image quality evaluation. This component evaluates which key organs are visualized in an ultrasound examination and how well the examination adheres to national guidelines published by the AIUM. Second, we developed an image quality evaluation form to be used by volunteer evaluators to quantify the quality of the images being reviewed. These data are analyzed using Minitab® 16. The repeatability and reproducibility of results from this analysis help to gauge the success of the training protocol itself. Three readers including two radiologists and a sonographer are performing the image evaluations.

Subjective evaluation by the participants demonstrated an ease in mastering the protocol and a satisfaction in acquiring new skills. Subjective initial evaluation by the trainers of the scans shows generally diagnostic quality scans with near complete organ coverage. The formal reader study is currently underway.

Initial results suggest that diagnostic quality scans may be created by the scanning and rapid training methods used in our study. This will enable widespread use of ultrasound in rural and under-resourced regions of the world. Further study and refinement of the training methods and protocols based on the results of this preliminary study should result in further improvements in organ coverage and diagnostic quality.