



## Portable prenatal control system with basic ultrasound to improve maternal mortality in rural Guatemala

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### Objective

Maternal mortality is a problem that threatens millions of women and their families worldwide. Huge differences exist not only between countries but also within the same country, where those who live in rural areas suffer the most from this disrespect for human rights. With the development of portable (and less expensive) ultrasound equipment, projects have been implemented for the use of ultrasound in rural areas, but an impact on maternal mortality has not been yet demonstrated. Our work aims to assess the feasibility and impact of a prenatal control program, using portable and low-cost diagnostic tools. This work seeks to evaluate whether the portable kit of the "Healthy Pregnancy" project, which incorporates basic ultrasound and blood and urine tests, allows rural itinerant nurses to provide prenatal care, resulting in an effective intervention to reduce maternal mortality. The aim is to bring quality prenatal care to rural areas to detect pregnant women at risk. If obstetric risk is detected, women will be referred early to a health facility.

### Methods

The project was conducted in all Alta Verapaz towns and in six San Marcos towns, from October, 2014 to December, 2016. Thirty one diagnostic kits were distributed among the rural nurses of the public health system. Backpacks contained a laptop, a USB ultrasound probe, a folding solar panel and an external battery. The kit is also equipped with: serology rapid test (for HIV, syphilis and HBV), a hemoglobinometer, a glucometer and urine test strips. The initial training was provided by obstetricians. The basic ultrasound performed included vitality, fetal presentation, number of fetuses, amniotic fluid evaluation, placental location and fetal biometry. A health information system was installed in all the laptops to register the attentions, including ultrasound images. Care, diagnosis and management were conducted by the rural nurses. Through the information system, remote and deferred quality control was performed by two physicians. Working with funds from International Cooperation and Development has conditioned the type of study. It was decided to reach the sample size with all pregnant women attended and to make the impact comparison with the official mortality data of each departments.

### Results

A total of 10, 108 women were attended. Fetal malpresentation was defined as non-cephalic presentation after 32 weeks, this happened in 4. 5% of all the pregnant women attended, which represented 15% of the pregnant women attended after 32 weeks. Fifty five twin gestations were detected (0, 54%) and twenty patients were referred for non-evolutive gestation. Seven women were referred due to suspicion of placenta previa. Although it was not among the purpose of the project, 11 pregnancies were referred for suspected severe fetal malformation. Quality control was assessed in 100% of the attentions by an obstetrician. A qualitative assessment was carried out in 4 levels and a good ultrasound study was considered if it received an assessment in the 2 upper levels. It was found that 87. 5% of the ultrasound performed had adequate quality. The prevalence of anemia was 12, 31% and 17, 5% for bacteriuria. Twenty-four pregnant women were found to be positive with rapid serologic tests and they were recommended to go to the health center to perform confirmatory tests. Seventeen cases of preeclampsia were detected. The nurses recommended 706 (6, 98%) correct referrals. To know the impact on maternal mortality, the MMR of the intervention group was compared with the MMR for each department. The total number of maternal deaths in our group of 8, 995 women (after excluding 1, 113 women with estimated date of delivery after the study closing date) was 9 (5 in Alta Verapaz and 4 in San Marcos), which represents an MMR of 100. 05. In Alta Verapaz, our MMR was 97. 98, 40. 97% lower compared to 166 in the entire department. Our MMR in San Marcos was 102, 25. 6% less than 138 for the entire department.

## **Conclusion**

The results obtained indicate that an intervention with portatil ultrasound can improve the quality of care of rural pregnant women in developing countries, at a reasonable cost. The system used allows us to offer a prenatal care with a good diagnostic performance, with good quality ultrasound basic exams and with an appropriate rate of correct references. Although without statistical significance, the impact on maternal mortality is promising.