

Appendix 1. Cost Analysis

Because of the difficulties we experienced in following a home-visit protocol, we conducted this cost analysis under a facility-based setting. We assume that the government will cover personnel costs for the staff operating the machines in a facility, and that there are no transport costs. We examined a five-year span for this analysis.

We estimate that one ultrasound machine could reach a catchment area containing 100,000 people, with an annual birth cohort of 3000 births (15000 births over five years). The cost of a refurbished Nanomaxx machine for global health buyers, as quoted by SonoSite in year 2014, was \$6000 for the machine and \$3500 for the probe, with a five-year warranty on the machine. One bottle of ultrasound gel covered about 40 exams per bottle at 1 USD per bottle, for a total of 375 USD in cost for 15000 pregnancies examined. A two-week staff training cost about 480 USD. The total cost came out to 10355 USD.

The Nepal 2011 Demographic and Health Survey (1) reported a rate of 37 intrapartum stillbirth or early neonatal death per 1000 pregnancies, so we assume roughly 555 perinatal deaths to occur in 15,000 births. Using the risk ratio of 7.09 and prevalence of 2.2% for non-cephalic presentation and risk ratio of 3.64 and a prevalence of 1.0% for multiple gestation derived from a separate study conducted in the same study population,(2) we estimated that 14% of perinatal deaths, or 78 perinatal deaths in 15,000 births, would be associated with non-cephalic or multiple birth.

We did not have data on the mortality risk or the incidence of placenta previa from our study population, so we used the incidence reported for Asia in a systematic review (12.2 cases per 1000 pregnancies)(3) and a perinatal mortality rate for placenta previa cases

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reported in an Ethiopian hospital-based study (447 per 1000 live births).(4) We then expect 82 pregnancies to end in perinatal mortality associated with placenta previa for every 15,000 pregnancies. Combined, 160 perinatal deaths associated with non-cephalic birth, multiple birth, and/or placenta previa may be averted with early diagnosis. Each life saved will cost \$65.

Our estimates make multiple assumptions. One, we make a very generous assumption that all perinatal mortality cases associated with non-cephalic birth, multiple birth, and/or placenta previa will be prevented with early ultrasonographic diagnosis. On the other hand, we also do not account for disability life years saved by preventing morbidities resulting from intrapartum-related complications, secondary prevention of preterm births (as preterm rates are higher among non-cephalic and multiple births), and maternal mortality or morbidity. The cost of ultrasound machines may also be cheaper for non-portable machines for facility-based use.

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