

Maternal Health in Zanzibar: Baseline Health Assessment
Global Health Technologies
Boston University and State University of Zanzibar

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Introduction

Maternal mortality is, in most cases, preventable. For this reason, 99% of maternal mortality cases occur in developing countries, where there are high rates of home births and hospitals lack for resources and well-trained staff. In a collaborative effort, students from The State University of Zanzibar's (SUZA) School of Medicine and Boston University's department of Biomedical Engineering completed a baseline health assessment of the current state of maternal care in Ungunja, Zanzibar, Tanzania.

Maternal mortality rates have seen an overall decrease in Zanzibar in the past several years, but the current rate – 287 per 100,000 deaths – is unacceptable, and maternal mortality rates in mainland Tanzania remain staggeringly high. This assessment marks the beginning of the Global Health Technologies program in Zanzibar. Over the next few years, students from SUZA and BU will gain a valuable understanding of the current maternal health system, and eventually improve it by developing a device that will suit the maternal health community in Zanzibar.

Methodology

This project began in Boston two months before the BU students' arrival in Zanzibar. The engineering students conducted a review of the most common challenges facing maternal health in developing countries, particularly anemia, postpartum hemorrhage, and pre-eclampsia. In addition, they became familiar with some of the existing methods for diagnosis and treatment of these ailments.

The five weeks of work in Zanzibar involved a systematic process of interviewing mothers, doctors, nurses, midwives, traditional birth attendants (TBAs) and laboratory technicians. Each of the three Boston University engineering students was paired with one of the three SUZA second-year medical students with whom they would conduct the interviews.

Mothers

While interviewing the pregnant or recently delivered mothers, the teams inquired about the frequency and quality of the mother's antenatal care visits. Any complications that had occurred during the pregnancy or delivery were noted, as

was the treatment of these complications. The mothers were asked whether they had any difficulty receiving care throughout their pregnancy, such as issues with transportation to the hospital. They were also asked why they chose to deliver where they did or would – either at the hospital or at home.

Hospital Health Staff

The health workers in the hospitals – doctors, nurses, and midwives – were all asked the same questions. What is the biggest barrier to maternal care? What do you see as the leading cause of poor maternal health and maternal mortality? How is that particular condition treated in this hospital, and how could the treatment be improved? These questions were meant to determine the biggest gap in the current course of treatment.

Laboratory Staff

The lab technicians were asked what testing takes place at their facility, what equipment is used for it, and what the cost is for the patient. Energy constraints for devices were also noted.

Traditional Birth Attendants (TBAs)

The TBAs were asked how much training they had received and how many years of experience they had. The frequency of their work (how many mothers assisted per month) was noted. They were asked what tools they used and who provided these tools. Lastly, they were asked why they thought women deliver at home instead of seeking care at a hospital.

Results

In total, over 150 mothers and 55 health workers were interviewed. Seven hospitals were visited including Mnazi Mmoja Hospital (MMH), Mwembeladu, Fuoni, Bumbwini, Rahaleo, Kivunge, and Makunduchi.

Mothers

Mild to severe anemia occurred in roughly one fourth of the women. Use of traditional medicine was common, often as a supplement to hospital supplied medicine. For anemia treatment, women were usually given a one-month supply of pills and advised to change their diet. When a hospital was experiencing shortages of pills, mothers would only be advised a diet change. Most women had experienced complications during at least one of their pregnancies. MMH had, overwhelmingly, the highest rates of maternal mortality and neonatal mortality. This was given by their statistics board, and also by the interviews conducted there. The six MMH mothers interviewed in the post-natal ward all had severe complications: two cases of PPH, one of which led to blood transfusion and neonatal mortality, two C-Section deliveries, and five cases of mild to severe anemia.

When asked if they had any difficulties accessing or receiving care, almost 100% said no. Interestingly, when asked specifically about transportation, some conceded they had to walk upwards of two hours to reach the hospital. In some centers, particularly at Bumbwini hospital, there was a financial barrier to receiving ultrasound testing, which can cost anywhere from 7,000 to 10,000 TSH. Some mothers stated they were not advised to get an ultrasound by their doctor, so they did not think to get one. Overall, women seemed to believe it was much safer to deliver at a hospital than at home. There was a general confidence in the hospital staff's ability to handle any complications that might arise during childbirth. This mindset came from both health education at the hospital and encouragement from their local community.

Transportation was often a barrier to women receiving quality care during their delivery. Though women understood the importance of giving birth at a hospital where trained medical professionals can handle any severe complications that may arise, they're unable to reach a hospital once they begin labor. While many of the women spoken to had given birth at home for at least one of her pregnancies, this was usually due to sudden delivery that rendered her unable to reach a hospital in time. They often stated that, had they had the time or money for transport, they would have preferred to deliver the child at the hospital.

Those women who delivered at home purposefully – not because of lack of transport to a hospital – usually did so because of privacy and cultural beliefs. Additionally, mothers who were forced deliver a child at home because of lack of transportation who experienced no complications would gain confidence in giving birth at home and elect to do so for any later children they had.

Hospital Health Staff

The general comments from doctors, nurses, and midwives at the hospitals were that there is a shortage of the supplies, staff, and space needed to provide patients with true quality care. Some facilities had only one ambulance, and some had no working ambulances. Many facilities did not have an ultrasound machine, and would receive a device from Mnazi Mmoja Hospital once or twice a month to assist pregnant mothers. Equipment used to aid mothers and infants was often broken, such as vacuums to realign a baby's spine during delivery and machines to clear a newborn infant's airway of mucus. Many hospitals also said there was a shortage of functional blood pressure machines, and frequent shortages of various kinds of pills such as those to treat anemia and high blood pressure.

Post-partum hemorrhage was treated with misoprostol in the maternal wards at Mnazi Mmoja and Kivunge, and oxytocin at Makunduchi, Bumbwini, Mwembeladu. Severe cases where a mother would need a blood transfusion were then transferred to Mnazi Mmoja.

Laboratory Technicians

Laboratory testing for antenatal care included an HIV test, malaria test, hemoglobin test, and urine test to check for protein and glucose levels. Hemocue was used for anemia diagnosis at all of the visited hospitals. Technicians said they occasionally have shortages of both the reagents and micro-cuvettes needed to use the device, which are the two main cost contributors. The cost to test for hemoglobin levels varied from facility to facility, and fell between 1,000 and 2,000 TSH (0.50 and 1 USD). Hemocue uses electricity, but has battery backup. Fuoni hospital used a paper hemoglobin test in their maternity ward, which the staff found inaccurate and unreliable. Hemocue was used in Fuoni's general ward, and though staff said it was more accurate than paper tests, the model they had was outdated. Urinalysis for pre-eclampsia diagnosis was done with paper dip testing at all facilities.

Traditional Birth Attendants

The eight TBAs spoken to had received a wide range of training, from no formal midwifery education to extensive training on mainland Tanzania. The equipment the TBAs used were consistent: gloves, a sterilized blade, and thread. These supplies were given by either the hospital, the TBA herself, or by the pregnant mother. Some TBAs noted that when they were lacking any of the supplies they would use household items to substitute, such as a plastic bag used as gloves or a ripped piece of cloth used as thread. Kangas, a common African garment usually worn as a headscarf or skirt, are sometimes used to clean fluids out of a baby's mouth or to stop excessive bleeding in delivering mothers by applying pressure.

All TBAs stated they encourage women to deliver in the hospital instead of at home. Most of the cases they handled were for those mothers who refused to go to a hospital for delivery or mothers who were delivering suddenly and could not get to a hospital in time. Though the TBAs generally had 10 to 20 years of experience, most said they had never experienced one or two complications while assisting in delivery. The TBAs noted that the number of home births had decreased drastically in the past several years, and they usually assisted in less than five births each month.

Discussion

The ineffective referral system in Ungunja is the main cause of MMH's excessive burden. Because all complicated cases are delegated to MMH, which is the only referral hospital on the island, its maternity ward handles 50% of Ungunja births. A mother's first child is considered a complicated case, as are any children after her fourth, so all of these are referred to MMH. Any pregnancies that will require a C-Section delivery are referred to MMH. Mothers diagnosed with pre-eclampsia are referred to MMH. Women suffering from severe PPH are transferred to MMH. And oftentimes women are referred too late, so they or their infant dies of severe shock while being transported to receive better care. These deaths contribute to MMH's maternal and neonatal mortality statistics, which explains the high numbers that

occur there. In order to decrease the burden on MMH, it is imperative that the quality of care in regional hospitals improves.

The leading gynecologist at MMH gave valuable feedback about what equipment they lack. Particularly, he pointed out that they do not have any available testing for renal and liver function. Poor function of the liver and kidneys can cause a host of problems both in maternal health and otherwise, so the development of an affordable bedside test would be incredibly valuable. A more cost effective point-of-care hemoglobin test would also be of great use. All of the hospitals we visited use a Hemocue device. Though it is relatively affordable, it could still be made cheaper without the use of micro-cuvettes and perhaps different reagents. Decreasing the cost of the blood level test to less than 1,000 TSH (0.50 USD) would encourage more women to come. A non-invasive method of hemoglobin testing might increase the frequency of testing for patients, as it could be made extremely cost effective and would remove the discomfort of drawing blood.

Anemia is treated with the prescription of supplement pills. These pills are free when given by the hospital, but hospitals experience shortages of them. They are given a supply meant to last three months that sometimes only lasts one. This is most likely due to patients flocking to better-stocked hospitals and depleting their supplies quickly. Though a hospital is given a three-month supply based on the surrounding population, it is not enough to suit the number of patients they actually receive. Improved distribution of resources to smaller health facilities – if there are any - might increase local confidence and reduce the burden on the larger hospitals. An exploration of dispensaries and small community clinics is necessary to determine the true cause of the frequent shortages.

Though the collected information shows many women do come to at least four antenatal care visits, doctors stated the number who come are not representative of the maternal population at large and it is common for women to begin her antenatal visits too late. The data of this field study is limited by the fact that only mothers at hospitals were interviewed. Thus, the study was only able to reach women who are aware of the benefits of antenatal care. Smaller community health clinics were not visited, so mothers who do not seek antenatal care frequently or at all may be neglected from the current data set. These people might benefit the most from a very simple device that could mean the difference between life and death in an emergency situation, or at the very least a health education program. One potential solution is a public service announcement to increase awareness of the benefits of attending antenatal care visits, such as a text blast in cooperation with one of the local phone companies.

The next phase of research should involve reaching these women and health workers by conducting interviews in more remote communities. It is important that these mothers and the traditional birth attendants or clinicians who attend them are recognized in this process to gain an honest understanding of the maternal health community.