A Comparative Analysis on Bicycle Emergency Transport Systems in Rural Tanzania

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After applying last year to the Woodrow Wilson Fellowship as an incoming, early-decision student, I quickly realized that my goals and ideas for research were at that point far too broad to come to fruition. Now I have a year of coursework under my belt, as well as the benefit of experience and guidance from speakers in the Johns Hopkins International Health community. Part of what has influenced me to apply again to the Woodrow Wilson Fellowship is my coursework in Kiswahili I and II this year. After a full year of seminar-style learning, I have grown to love both the language and, by extension, what I know of the culture of East Africa.

Although most of Africa struggles with disease, corruption, poverty, lack of resources, and poor economic growth, Tanzania has certainly not escaped the burden of these challenges. Stemming from large issues in government corruption and one-party control, the country has struggled to build a foundation of low, mid-range, and high-level job markets. Because of this continually fluctuating economic system, 90% of Tanzania's population lives in poverty. This impoverished majority almost solely relies on subsistence farming techniques to survive, with nearly nonexistent help from the government. Because almost all of rural Tanzania lives in poverty and on tracts of land that can distance over 9km or more from the nearest system of infrastructure, it makes the ability to access medical care nearly impossible.

This incapability to travel to see a physician is one of the most detrimental aspects of rural life in Tanzania. Because this country suffers from an estimated 1,600,000 cases of HIV/AIDS (8.8% of the population, higher than the 7.5% average given to the Sub-Saharan African region and more than eight times the global rate), as well as shares Africa's malaria epidemic, the need for medical care is incredibly crucial (UNAIDS, 2004).

Not only do chronic and acute diseases threaten the lives of rural Tanzanians, but also complications with maternity and neonatal care. Tanzania sits at the top of the charts for maternal mortality rates for Sub-Saharan Africa, with over 1,500 deaths per 100,000 live births in 2006. Neonatal mortality rates follow suit, with studies showing 125 per 1,000 births end in fatalities (Hinderaker, 2012). However, when looking deeper, it becomes apparent that many of the deaths from pregnancy are not due to the quality of medical care, but rather the access to health professionals. According to a study conducted by the International Journal of Obstetrics and Gynecology, in 1995 there were 136 stillbirths and neonatal deaths in two districts of Tanzania, 52 of which were recorded to have happened in the individual's home (Hinderaker, 2012). Nine more of these were also recorded to have taken place on the roadside while trying to reach a hospital. Out of those who tried to make the trek to a healthcare facility, 55 of the deaths were attributed to individuals that had a complete lack of transportation options. Out of the 19 that used either an ambulance or other mode of transportation, none of the deaths recorded were deemed "preventable" by the study. This shows that not only for acute and chronic diseases, but also for maternal and neonatal care, it is vital that rural citizens of Tanzania have a mode of transportation to, and from, a healthcare facility.

Because the upfront and maintenance costs of keeping a hospital ambulance are many times out of the financial reach of rural hospitals in Tanzania, there is a large need for an

intermediate mode of transportation that is dependable, accessible, efficient, and cost-effective. I would like to propose a possible solution to this problem of rural isolation is the creation of a bicycle-ambulance bike-share system. By instituting a pilot program in the northern town of Arusha, Tanzania, I would like to research the efficacy of the bicycle-ambulance system in rural areas of Tanzania.

By first recording a 3-month set of preliminary data from the nearest hospital (Selian Lutheran Hospital), I would build a foundation to assess efficacy. The healthcare facility would be questioned on the amount of individuals who have been treated from the surrounding villages, what their outcomes and diseases were, and if there illnesses were due to a chronic or acute ailment. By asking questions such as what the mode of transportation was that was used by each patient, as well as the opinion of the medical professional if time was a major factor in each patient outcome, I would be able to gather sufficient quantitative information to assess the need the villagers have for a transportation system.

After the 3-month span of preliminary data was recorded, the next step would be to institute a bicycle-ambulance vehicle for use in a targeted village that has the least access to care (to be determined after the initial data is collected). I have already contacted Transaid and the World Bicycle Relief (WBR), non-profit organizations that have experience in this specific intermediate mode of transportation. By using these institutions to train anywhere from two to three individuals in bike repair and maintenance in the selected town, there would always be a volunteer that could keep the bicycle running properly and at an easy-to-access location agreed on by the village. After spreading the message of our program to all residents, the same questions and data would again be collected for a 3-month span in order to compare.

This pilot program would be the first of its kind in Tanzania, a country in which the majority of the population lacks access to care and thousands die each year just because there is no transportation to a physician. Although it would be incredible if the government of Tanzania would instead build a larger health infrastructure in rural areas, the reality is that those in power lack the funds and perhaps political will to spread health services across their nation. By using an intermediate form of transportation, Tanzanians would have the opportunity to hopefully live longer life spans and stop preventable deaths, without the high cost of gas-powered ambulances.

The implementation of bicycle ambulances on a large scale cannot be completed in Tanzania until there is preliminary data to prove its efficacy. With the Woodrow Wilson Fellowship, I would be able to begin a pilot program in Tanzania that could quite possibly change the course of health outcomes in rural provinces of East Africa.

With my plans to continue learning Kiswahili (the most prevalent spoken language in rural areas of Tanzania) and my coursework in Public Health, I feel that I have the education and resources to accomplish this research project. However, I believe the most important quality in any successful Woodrow Wilson Fellow is a true passion for the task at hand. For me, I have dreamed of working in Africa since I was a little boy, however I never had the funds or the opportunity to do so. The reason I chose Johns Hopkins was because I saw how much good the institution has been able to do through research and education, and I wanted so desperately to be a part of that community. I wholeheartedly believe that this research project would allow me to not only be a part of the *good* our University does throughout the world, but also to discover methods that could save the lives of thousands.