

ABSTRACT

Pregnant women in sub-Saharan Africa exhibit a particularly high incidence rate of urinary tract infections (UTIs) which can lead to severe kidney damage and infant mortality. In order to overcome the access barrier to healthcare experienced in these developing countries, a low-cost test strip for UTI screening is being developed through a small-scale hand stamping process. By minimizing the number of testing parameters to three, these test strips are made accessible to community health workers (CHWs) who typically have limited exposure to education. These individuals act as liaisons between the formal health care network and rural communities and will be the primary mode for test strip distribution. Beyond the detection of UTIs, this affordable and effective urinalysis technology can be expanded to screen for a myriad of treatable diseases to improve the accessibility of healthcare in developing nations.

SUMMER 2018: SIERRA LEONE



Figure 1: Ukweli team at Kamabi Clinic on day CHWs receive stipends and training

- This summer the Ukweli team members spent three weeks in Sierra Leone visiting various Community Health Clinics, Community Health Posts, hospitals and pharmacies to interview CHWs, Community Health Officers and Nurses in Charge. Interviews were conducted with the staff at these facilities in order to gain insights on how to best develop our business model and ultimately launch our venture.
- Identified three employees and developed contracts for them to work on the ground for Ukweli. The three positions needed to launch the venture are quality control, distribution and training.
- Our translator Hassan was a community mobilizer during the Ebola epidemic. His experience and knowledge for community engagement helped us create a instructor guide and oral exam to ensure that CHWs can properly screen community members for UTIs.
- Developed a concept of operations for Ukweli.

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OUR TEST STRIP

- **Affordable:** Ukweli test strips are produced using a hand stamping method driving the cost down to 500-1000 Leones.
- **Specific:** Screens using a 3 parameter assay instead of 10 parameters, allowing for an easy interpretation of results.
- **Accessible:** Ukweli partners with World Hope International and a distribution network of over 1000 trusted Community Health Workers.

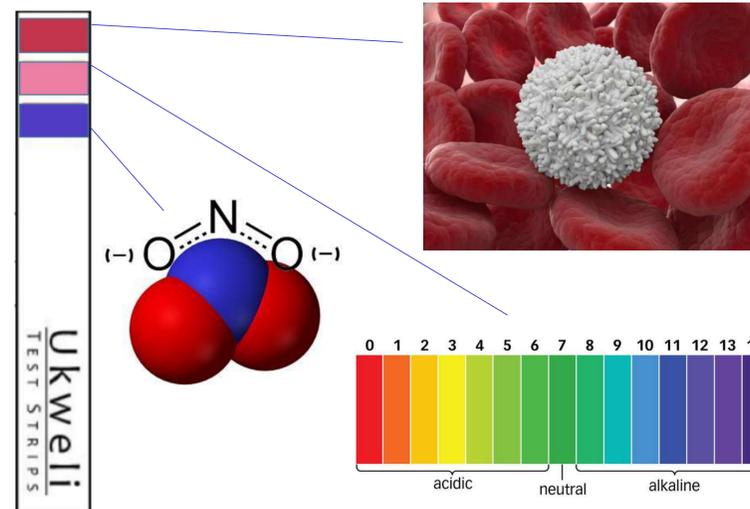


Figure 2: Design of three parameter test strip

- The three parameters include nitrites, pH and leukocytes. These assays are highly sensitive, and they are comparable with current standards as they have a 93% confidence level.

METHODS

- Stamping is a method of imprinting one surface upon another and has many applications in metal manufacturing, microfluidics, product fabrication, and material sciences. We have performed several tests on the stamping process, including testing for imprint consistency, liquid deposition, liquid dispersion, pH response, and more.

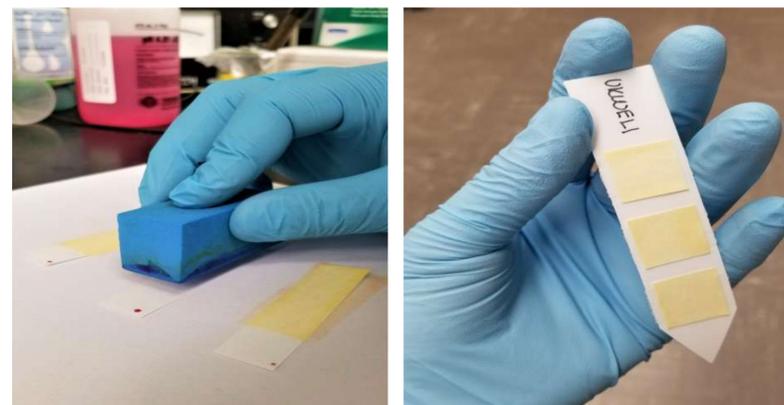


Figure 3 and 4: Hand stamping method and test strip prototype

OUR OPPORTUNITY

- Sierra Leone currently has the **highest maternal mortality rate** and the **fifth highest infant mortality rate** in the world. To help reduce these rates, Ukweli provides an affordable, easy way for pregnant women in rural and urban areas of Sierra Leone to screen for UTIs.
- There is currently no screening tools for UTIs rural areas due to limited accessibility to healthcare. Ukweli aims to bridge this gap by encouraging individuals to seek care before their condition worsens and causes permanent damage.



Figure 5: Instructor teaching CHWs on how to screen community members

FUTURE PLANS

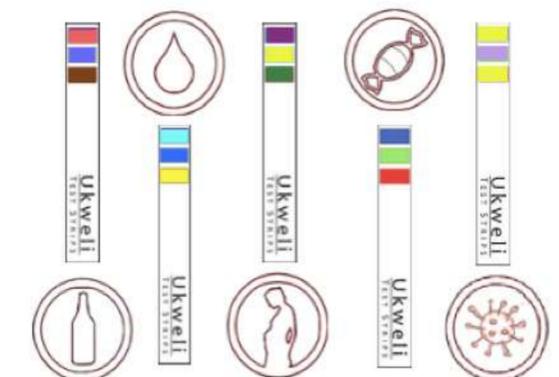


Figure 6: Possible expansion to other disease screening strips

- Verify that the design is effective under various conditions (temperature, humidity, light sensitivity) and ensure that it produces no false positives.
- Hire three employees to work for Ukweli in Sierra Leone.
- Obtain a marketing license to sell strips to CHWs.
- Make Ukweli strips a platform technology to screen for other diseases such as diabetes, anemia and preeclampsia.
- Publish paper that discusses how to create a sustainable venture centered around maternal health.