

Ghana, less than 20% of researchers are women; in Guinea, only 6% of researchers are women. The African Research Academies for Women (ARA-W) is a non-profit organization founded in 2013 to tackle STEM gender disparities found in many African nations. Our mission is to expose young women to research careers and equip them with skills necessary to succeed academically and in the workforce. We aim to accomplish this by organizing career fairs for high school students and sponsoring research fellowships for university and post-baccalaureate students.

**Structure/Method/Design:** In the spring of 2014, we raised \$8,000 and established relationships with Ghanaian research institutions. In the summer of 2014, ARA-W fully supported 5 Ghanaian fellows as they completed summer internships; the following summer 10 new fellows were funded. Beyond summer research exposure, we pair each fellow with a mentor in a related research field and encourage fellows to serve as ambassadors to young women in their respective hometowns.

**Outcome & Evaluation:** Our team is composed of dedicated university students across the United States, professionals from around the world, and numerous faculty advisors. Regarding our initiative, 2014 Nobel Laureate May-Britt Moser said “training one may change the lives of hundreds of women at the next stage.” ARA-W attended the Clinton Global Initiative in 2014 and 2015, was invited to the US-Africa Leaders’ Summit at the White House in 2014, and was selected as the African Youth Excellence Organization of the Year.

**Moving Forward:** We are currently developing a Research Track for the mandatory one-year service after college in Ghana. This track will be available in 2016. We are also establishing partnerships to launch an International Exchange Program in 2017 to provide fellows with a breadth of research experiences. Emory University, the University of Pennsylvania, and John Hopkins University have confirmed their interest in hosting students. After developing the necessary relationships, we hope to expand our program to Nigeria by the summer of 2017.

**Abstract #:** 2.031\_TEC

### **O Dia de Dona Maria – Using technology and community based participatory research to improve healthcare delivery in a Brazilian urban slum**

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**Background:** Residents of urban slums are at increased risk for both communicable and non-communicable disease (NCD). As the diabetes prevalence rapidly increases in low-and middle-income countries the burden of communicable and NCD in slums has also increased in parallel. Multimedia from community-based participatory research (CBPR) has been used to overcome barriers to healthcare in vulnerable communities, but is not universally incorporated into epidemiologic research. Here we highlight how CBPR was

used to improve study quality and improve healthcare delivery in a study of diabetes burden in a Brazilian urban slum.

**Methods:** We conducted a cross-sectional study in an urban slum of Niterói, Brazil to assess diabetes burden and included an adaptive community-participation arm that allowed for stakeholders to identify gaps in care and design solutions. Stakeholders identified nutrition as a major concern, and hosted events with healthy food from local stores, with accompanying recipes and pamphlets. As research progressed, the bidirectional learning process of CBPR identified illiteracy and vision problems as barriers to interacting with or understanding study material, in addition to material from healthcare providers. In response, stakeholders produced a music video recounting a fictional pre-diabetic’s experience as she learns to cook and incorporate healthy habits into her routine. The video was distributed to stakeholders and available on YouTube.

**Findings:** The average age of the 373 participants was 54.4 years; 67.8% (n = 253) were female. There were 165 (44.2%) diabetics, and 208 non-diabetics. Among the diabetics, 59 (35.8%) reported illiteracy or incomplete primary school (grades 1-4), compared with 52 (25.0%) non-diabetics. Of the 262 beyond this education, 68 (25.9%) reported vision problems. The mean age of those with vision problem was 56.1 years compared to 52.6 years for those without.

**Interpretation:** The bidirectional nature of CBPR allowed for stakeholders to adapt the study design and materials to the local context. Production of the video resulted in reports by participants of greater satisfaction with their care. Further, health professionals adapted pre-existing protocols to include more spoken and visual material.

**Funding:** This project was supported by a grant from the US Student Fulbright Program to RES.

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### **Transforming project effectiveness with a simplified wealth questionnaire paired with an easy-to-use mobile platform**

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**Program/Project Purpose:** Government and donor-supported social programs in developing countries prioritize serving the poor: those most in need, most at risk, or most marginalized. However, most programs never learn how well they have done, let alone being able to assess how they’re doing at the time of service provision. A simple, easy-to-use, easy-to-interpret, tool to survey program beneficiaries to determine their relative wealth is needed.

**Structure/Method/Design:** Supported by an expert panel, we selected a standard of reliability to compare a short questionnaire against the full Demographic & Health Surveys (DHS) questions that is replicable, of low administrative burden, and highly correlated with original DHS results. We created simplified, country-specific versions of the DHS wealth index questions, reducing

the number of questions from 30–60 in the original index to 8–18 questions in the new index. The new index has high agreement with the original survey results ( $\kappa > 0.75$ ). The new questions are easier to answer than the original questions, with fewer response options. Data collection has been further simplified through the creation of a phone/tablet-based survey that aggregates and analyzes results.

**Outcome & Evaluation:** The simplified mobile survey was piloted in India and Colombia where users report satisfaction and ease-of-use. Additional pilots will begin in December 2015.

**Going Forward:** Our simplified, mobile-version of the DHS wealth asset makes it possible for any social service program to determine the relative wealth of those they are serving through a short client survey, transforming the performance of programs and improving health outcomes. Moving forward we will conduct research to assess the wealth of populations receiving care in a range of facility types using the simplified index and DHS data to contextualize program results.

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### Midterm evaluation of health-provider alert functionality in a program of automated telephone monitoring and self-care support for diabetic patients in Colombia

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**Purpose:** Trials suggest that mobile health (m-health) interventions can improve self-care behaviors and outcomes for patients with diabetes mellitus (DM) [1,2]. Llamada Saludable is interactive voice response (IVR) m-health program used to monitor DM patients and provide self-care education between outpatient visits. The program was implemented in Medellin, Colombia from July–September 2015 in collaboration with the Living Lab Telesalud program at the Universidad de Antioquia and a large insurer for low-income patients (SaviaSalud). In addition to evaluating effects on DM management, this trial assessed the provider alert system with real-time monitoring of patient-reported adverse health events.

**Methods:** 150 DM patients received weekly, automated calls for 12 weeks. At program entry, patients received education on healthy living and DM symptom management. Patients were informed they would receive a follow-up call from a health professional if their responses indicated a need for additional assistance. During IVR calls, patients answered questions using touch-tone phones, which triggered automated email alerts to clinical staff. Paramedics completed less critical follow-up calls while physicians called insulin dependent patients reporting blood sugar  $< 90$  mg/dl or  $> 300$  mg/dl.

**Outcomes and Evaluation:** Participants completed roughly 1,300 IVR assessments (72%) and clinicians received 319 email notifications regarding 129 individuals. Although clinicians were concerned about the potential for patients to exploit the alert feature to quickly access a physician, patients expressed reassurance that providers were “accompanying” in their illness. A majority of follow-up (87.5%) included self-care education, while only 6.2% resulted in advising the patient to visit their primary care physician (5.9%) or emergency services (0.3%).

**Going Forward:** Based on this successful pilot, the Llamada Saludable program is expanding to additional municipalities around Medellin and other chronic diseases (e.g., renal disease, COPD). The functionality of the alert aspect of the program is integral to sustainability and scaling so the system is responsive to adverse health events. Our experience indicates institutions implementing m-health programs with provider-alert feedback mechanisms should consider their role as patient education rather than solely an emergency response system.

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**Abstract #:** 2.035\_TEC

### References:

- [1] Piette JD, et al. *Telemedicine and e-Health* 2016.
- [2] Handley MA, et al. *Ann Fam Med* 2008.

### Innovating for global health: Study of healthcare technology failure in southern Malawi

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**Background:** Physicians in low and middle-income countries (LMIC) face many challenges, including overwhelming patient-to-staff ratios, an unstable electric grid, and a general lack of resources. Technology in LMIC often fails, further compounding the difficulty of providing adequate healthcare. Few medical devices are manufactured locally, making equipment problematic to maintain and repair. In 2013, the World Health Organization estimated 70% of medical devices in LMIC are non-functioning, affecting the ability to provide adequate healthcare. Additionally, devices that cannot be repaired locally are placed in “medical device graveyards”, potentially causing adverse long-term health effects due to chronic exposure to electronic waste sites. Therefore, the aim of this study was to establish an understanding of challenges associated with medical device donations, repair, and maintenance in LMIC in order to improve short- and long-term health outcomes.

**Methods:** To understand LMIC barriers to acquiring, maintaining, and repairing medical equipment, an exploratory study was conducted at clinical settings in southern Malawi. Thirty-six clinical staff participated in surveys and focus groups to provide information on medical device challenges. The study was approved through the Virginia Tech Institutional Review Board as well as hospital administrators at collaborating institutions.

**Findings:** Results from the study emphasize the inadequacy of donating medical devices and the importance of community-based