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**Program/Project Purpose:** About half of the populations without access to improved drinking water are in Sub-Saharan Africa (319 million).[1] Mozambique, as part of this statistic, is also ranked as one of the most poverty-stricken countries in the world (180 out of 188 in the UN Human Development Index).[2] In an effort to provide every person with the human right to water and sanitation, World Vision Mozambique has implemented the WASH (Water Sanitation and Hygiene) Project. However, has this project been successful and ultimately benefited the country? In an effort to understand the impact that introducing a reliable source of water has in a Mozambican community, we conducted a field study to assess the aftermath of WASH.

**Structure/Method/Design:** Two local districts, Chibuto and Guija, were selected; from each, a community with an old water borehole and a new borehole was identified. In a span of six weeks, participants were chosen and surveyed based on their role in the community: adult community member, secondary student, and health care provider or professor.

**Outcome & Evaluation:** Results show that communities are utilizing the water bore holes to maximize their everyday chores; however, they are not correlating the serious health implications that are related to lack of potable water or poor sanitation methods. Based on the results of the study, we recommend that World Vision initiate a continuous follow up after water borehole implementation in a community. An evaluation of this action could help increase health sustainability and an understanding of the importance of water in Mozambican communities.

**Going Forward:** Further evaluation methods within communities would assess sustainability measures in water, hygiene and sanitation. A better understanding of the importance of water among community members would improve the overall health and infrastructure in Mozambican.

**Source of Funding:** The project was funded by the Dornsife Global Development Scholars Program at Drexel University.

**Abstract #:** 2.005\_PLA

### Seasonal Variations in Fetal Growth Patterns in Ulaanbaatar City, Mongolia

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**Background:** Ulaanbaatar, the capital city of Mongolia sees some of the world's most extreme seasonal variability in climate and air pollution levels. In the winter months, temperatures can drop to  $-40^{\circ}\text{C}$  and particulate matter and gaseous pollutant concentrations at this time can exceed over 20 times WHO standards. In the summer months, air pollution levels are low and temperature

extremes can reach up to  $+33^{\circ}\text{C}$ . This cross-sectional study examines whether there are seasonal variations in fetal growth patterns on prenatal ultrasound evaluations given these extreme environmental fluctuations.

**Methods:** We collected measurements from 4373 fetal ultrasounds from three antenatal care clinics in Ulaanbaatar, Mongolia from March to July 2016. Biparietal diameter (BPD), abdominal circumference (AC), and femur length (FL) growth parameters were estimated from each sonographic evaluation. Z-scores were calculated for each measurement using published norms by weeks gestation. Season of conception was grouped in tertiles: Winter (November to February), Spring (March to June), Summer (July to October). The impact of season of conception on second and third trimester ultrasound Z-score measurements was assessed with two-way ANOVA with interaction at a 0.05 significance level.

**Findings:** There were significant differences in FL, BPD and AC by season of conception. FL Z-score ( $p=0.033$ , Winter > Spring), BPD Z-score ( $p=0.011$ , Winter < Summer), and AC Z-score ( $p=0.014$ , Winter < Summer). BPD Z-score also differed by trimester of pregnancy ( $p=0.0002$ , Tr2 > Tr3). AC Z-score did not differ by season of conception, but did differ by trimester ( $p=0.0003$  Tr2 > Tr3).

**Interpretation:** Our preliminary findings suggest that there are seasonal patterns in fetal growth in Ulaanbaatar, Mongolia. To our knowledge, this is the first study on seasonal variations in fetal growth patterns in Mongolia. These findings will help to better understand environmental changes on fetal growth, and to develop interventions to reduce adverse fetal and birth outcomes.

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**Abstract #:** 2.006\_PLA

### The Effects of Early Childhood Development Centers on Child Development and Nutritional Outcomes in Estancia, El Salvador

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**Background:** In El Salvador, it is estimated that 35% of households live in multidimensional poverty with limited access to education, adequate nutrition, and economic opportunities. Poverty is known to affect child development and educational outcomes. An estimated 25% of three and four-year children in El Salvador have a low Early Childhood Development Index (ECDI) score. Doctors for Global Health partnered with a local non-governmental organization, *La Asociación de Campesinos para el Desarrollo Humano* (Peasant Association for Human Development, CDH), and facilitated the creation of Centers for Integrated Child Development (CICD) for children two – six years of age; children receive a curriculum that includes motor, language, and socio-emotional activities

and nutritional supplementation. The effect of these centers on child development outcomes are unknown.

**Methods:** We conducted 255 in-home surveys across eight communities in Estancia from September 2015 through February 2016. Two of the eight communities surveyed had CDH-sponsored CICD's. We collected the following information: sociodemographic including factors influencing poverty; food security using the Latin American and Caribbean Household Food Security Scale, which incorporates food availability, access, and allocation of food within the household to estimate vulnerability (ELCSA has been internally and externally validated across Latin America); dietary diversity using a 22-item food frequency questionnaire adapted to the local diet; child development using Ages and Stages (available in Spanish and validated in low and middle-income countries), and child anthropometric data (weight, length/height). Using SPSS software, we analyzed the impact of early child development centers on nutritional status and achieving age-appropriate developmental milestones.

**Findings:** Children attending CICD's had statistically significantly better communication scores, fine motor skills, social interaction skills, and problem solving. There was no association between attending CICD's and improved gross motor skills. Additionally, children who attended CICD's appeared to have improvement in their weight-for-age Z-scores.

**Interpretation:** Children who attended CICD's in Estancia, El Salvador had better nutritional status and developmental measures than those who did not attend. The dual focus of the CICD's on nutrition and early stimulation/education may provide a useful model for mitigating the effects of poverty on child development and nutritional outcomes in rural El Salvador and similar settings.

**Source of Funding:** Harvard Medical School Scholars in Medicine Program.

**Abstract #:** 2.007\_PLA

### Evaluation of the Health Impact of a Water, Sanitation and Hygiene Intervention in Mugombwa Refugee Camp

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**Background:** Globally, refugees constitute approximately 32% of “forcibly displaced” persons. Water, Sanitation, and Hygiene (WASH) interventions are of high importance in emergency situations because of the health impact of poor water, sanitation, and hygiene practices. In 1994, 42,500 deaths of Rwandese refugees in the Democratic Republic of Congo were caused by water-related parasites. Health outcomes in these situations can be improved by increasing access to clean water, adequate water supply, access to sanitation facilities and improved hygiene practices. Studies have shown that WASH interventions can decrease the incidence of diarrheal disease by 15%-50%. Currently, 70,711 refugees are in emergency situations in Rwanda. Gihembe, Kigeme, Kiziba,

Mugombwa, Mahama, and Nyabiheke are refugee camps in Rwanda where displaced persons are hosted. Presently, 8,492 refugees live in Mugombwa refugee camp. This camp has undergone a water, sanitation, and hygiene intervention organized by World Vision Rwanda. This intervention was designed to increase access to clean water, sanitation facilities and improve hygiene practices at the individual, household, community and institutional level. The purpose of this study was to evaluate the health impact of a WASH intervention in Mugombwa refugee camp in Rwanda.

**Methods:** This study used a mixed methods approach consisting of twenty survey questionnaires, ten key informant interviews and two focus group discussions to examine the health impact of this WASH intervention on the incidence of diarrheal disease.

**Findings:** Study findings indicated that all of the participants had access to clean water in the camp. Participants also reported practicing proper hygiene at critical points. Health center data showed that the overall incidence of diarrhea had decreased in the camp. Damaged water pipelines, insufficient access to soap for handwashing were identified as barriers faced by refugees living in the camp.

**Interpretation:** Study findings suggested that refugees living in Mugombwa have access to an improved water source, an adequate water supply, and sanitation facilities. These results also indicated that hygiene promotion initiatives have affected hygiene practices of these refugees. These findings were useful in identifying factors such as water pipeline issues, a limited supply of soap, socio-cultural norms that influence water supply, sanitation and hygiene practices of these refugees.

**Source of Funding:** Dornsife Global Development Scholars Program.

**Abstract #:** 2.008\_PLA

### Transforming Global Health Education with the Utilization of Simulations and Workshops

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**Program/Project Purpose:** Previous studies have investigated the utilization of the IFMSA (International Federation of Medical Students' Associations) model, the Latin American SOCEM (Sociedades Científicas de Estudiantes de Medicina) model, and curriculum changes as a method to addressing education on global health topics, particularly neglected tropical diseases (NTDs). However, little has been done on the integration of simulations and workshops in graduate education as a means of addressing the knowledge gap in global health education. While these issues may be encountered by students in future clinical settings they are currently rarely encountered in the United States. As such, the skills necessary for these situations are not a part of the fundamental medical education.

For the past 6 years the global health organization at UCF College of Medicine, MedPACt, has held an annual global health conference. All of these conferences have included an element of simulation education. Here, we present a variety of simulations in