The Global Center for Integrated Health of Women, Adolescents and Children
Year 7 Report

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Global WACH makes scientific discoveries, cultivates leaders, and bridges disciplines to advance the tightly connected health and well-being of women, adolescents, and children

The Global WACH Center at the University of Washington specializes in research to benefit woman, adolescent, and child health. Our approach focuses on critical windows — during birth and infancy, during the transition from childhood to adolescence, and from adolescence into adulthood — where healthcare interventions can have long-term benefits across the lifecycle. Our Center believes that when women, adolescents, and children thrive, communities thrive.

Scientific discovery is a major pillar of our mission. Each year we track our progress towards expanding and contributing knowledge that will improve health outcomes of women, adolescents, and children around the globe. Global WACH is home to 31 active research grants with an annual budget of ~$8.8 million. In 2017-2018, Global WACH researchers submitted 27 new proposals to funders including the National Institute of Health (NIH), Bill & Melinda Gates Foundation, and WHO. The Center harnesses technological and social innovations to speed health improvements and decrease unnecessary deaths and morbidity among women, adolescents, and children. As part of our mission, the Center maintains deep partnerships with academic, health, and government institutions around the world to expand the legitimacy and impact of our science and service.

Global WACH has three scientific priority areas: Gut health and child survival, HIV through the lifecycle, and family planning decision support. This year, Global WACH research teams made strides in all three domains to improve health and wellbeing for women, adolescents, and children in the health systems and communities we partner with.
Not every child grows to their full height potential. “Stunting”, the scientific term for children having a very low height for their age, affected more than 150 million children in 2017 and its consequences are more severe than simply being short in stature. Stunting is caused by poor nutrition and chronic infections. There are dire long-terms consequences for those affected in the first two years of life including poor performance in school, low wages as an adult, and lost productivity. With almost one in five children worldwide classified as stunted, there is tremendous opportunity to reduce stunting to improve economic and development potential. Addressing stunting is a multifaceted and complex proposition that bridges a child’s feeding habits, environmental surroundings, parenting practices, and exposure to infections.

This year, Global WACH investigators contributed to new scientific discoveries for preventing stunting and improving height for age. Two qualitative studies published in Maternal & Child Nutrition and Public Health Nutrition respectively examined maternal perceptions of their children’s appetite and their child’s linear growth (how stunting is measured). The study examining perceptions of growth found that in areas where growth in children is perceived in comparison to siblings and peers, interventions to prevent stunting may be viewed as having limited impact and present a barrier to implementing programs to reduce stunting. The conclusion noted that further education among caregivers may be needed to raise awareness on the social and economic impact of stunting. In another study entitled “Piecing together the stunting puzzle: a framework for attributable factors of child stunting” Global WACH researchers sought to develop and test a quantitative and qualitative framework for measuring the diverse causes of stunting. The study found that infectious diseases were a large contributor to the stunting burden and dietary indicators carried a large association in African settings. The authors noted limitations in their model and highlighted a need for more robust tools to accurately capture the complex and interrelated causes of stunting.
Global WACH investigators also highlighted the challenges inherent in trying to prevent stunting. In a publication in the American Journal of Tropical Medicine and Hygiene entitled “Challenges in Assessing Combined Interventions to Promote Linear Growth”, Global WACH scientists emphasized a lack of evidence to guide policymakers towards an optimal package of interventions for improving linear growth. The authors used two common and different intervention packages—deworming and micronutrient supplementation—to illustrate these challenges in resource-limited settings. Dr. Judd Walson also contributed to a publication in the Archives of Disease in Childhood journal entitled “Evidence-based approaches to childhood stunting in low and middle income countries: a systematic review.” Dr. Walson and his co-authors found that “successful interventions were characterized by a combination of political commitment, multi-sectoral collaborations, community engagement, community based service delivery platform, and wider programme coverage and compliance.”

New studies funded this year sought to incorporate these characteristics to provide critical science toward improving child growth and development. Under the DeWorm3 study that seeks to interrupt the transmission of soil transmitted helminths (STH), Global WACH investigator Dr. Arianna Rubin Means received funding from the Natural History Museum for the India STH Elimination Landscape project. STHs are parasitic intestinal worms that feed on nutrients from those they infect, particularly protein and iron, and can cause loss of appetite, anemia, and malabsorption of nutrients. This can result in stunting and delays in cognitive development in children who are heavily infected with STHs. The STH Elimination Landscape project will use implementation science methods to identify opportunities to bring STH elimination programs to scale in India. The project will generate evidence on the feasibility of transitioning to a community-wide mass drug administration model, building upon school-based deworming platforms. The study teams at the University of Washington and Christian Medical College (Vellore, India) work hand-in-hand with the Government of India and state governments to identify best-practices for scaling and sustaining the STH transmission interruption model within the health system. This new project joins the ongoing implementation science work of DeWorm3 in testing the feasibility for breaking transmission of STHs in Malawi, India, and Benin.

The DeWorm3 team produced several publications this year including the protocol for a large cluster randomized trial to test the feasibility of breaking the cycle of transmission of STHs using biannual mass drug administration across the entire community and the implementation science protocol to assist policy makers in scaling the approach if successful, both published in PLoS Neglected Tropical Diseases. The community-wide approach seeks to innovate on current annual
school based programs and move towards eliminating transmission. In addition, the group also published their work on an analysis of the sensitivity of existing diagnostic tools for STH transmission and about diagnostic tools for STH, as well as a pathway for new diagnostic product development.

Breastmilk may also hold answers for improving child growth and development. Global WACH investigator Dr. Christine McGrath received funding this year to study milk samples in infants to identify differential milk components associated with illness and undernutrition as part of the Childhood Acute Illness and Nutrition Network (CHAIN). As part of this award, she will examine association between breastmilk quality and nutrition status in hospitalized children and determine whether a mother’s milk composition is associated with nutritional status, linear growth, and morbidity in children, and hospitalization.

From a bold approach to breaking the transmission of parasitic worms, to understanding caregiver perceptions of child feeding and the nutritional content of breastmilk, to developing models and tools to assess stunting, Global WACH scientists are working hard to develop and scale solutions to ensure children everywhere grow to their full potential.

Shaping how we treat critically ill children in resource-limited settings
International treatment guidelines for critically ill children in hospitals are the standard but they are not always met and sometimes, even when fully implemented, do not yield acceptable reductions in child mortality. Global WACH investigators are engaged in research to generate evidence to shape the implementation of international treatment guidelines and inform future guidelines in response to advances in science for critically ill children.

Death rates remain high among children with acute illness, especially those who are malnourished. And yet, precise cause of death are poorly understood. Lack of understanding of the immediate and underlying causes of death poses a critical barrier to developing effective strategies to prevent mortality among this vulnerable group. This year, Dr. Donna Denno received funding to use minimally invasive tissue sampling (MITS) to identify the root cause of child deaths within the Childhood Acute Illness and Nutrition Network (CHAIN) in Malawi. Minimally invasive tissue sampling, also known as a minimal invasive autopsy, uses needle sampling through the skin to sample organs and body fluids following death. This technique is much more acceptable than full autopsy because there are very minimal marks that are left on the body after the MITS procedure. The MITS study in Malawi will test the feasibility of adding intestinal sampling to the MITS protocol. In standard MITS the gastrointestinal tract is completely ignored, and yet intestinal dysfunction is thought to be an important underlying cause of child malnutrition and may play an important role in child death. The study also uses a novel grief counseling approach delivered by a Malawian palliative care team to support families who experience the death of a child—regardless of whether they agree to participate in the MITS study. This study has the opportunity to not only identify causes of death in Malawi, but also improve the MITS technology and implementation that can be used by other groups around the world.

Global WACH also had a series of studies funded this year to investigate cytomegalovirus, or CMV, in critically ill children. Cytomegalovirus is a very common virus that infects over half of adults by age 40. Most people infected with CMV do not display symptoms and the virus lays latent in their system. During times of immunosuppression however, the virus can reactivate and have detrimental health impacts. Dr. Jennifer Slyker has been particularly interested in how CMV viremia impacts critically ill children. In a publication this year entitled “The Potential Harm of Cytomegalovirus Infection in Immunocompetent Critically Ill Children” Dr. Slyker and her co-authors emphasize that CMV viremia reactivation is common in critically ill adult patients and highly correlated with adverse outcomes but has not been thoroughly explored among critically ill children, particularly in resource-limited settings where it could be a substantial contributor to mortality. Ultimately it is possible that treating CMV during critical illness may improve survival. Dr. Slyker received funding from the National Institute of Health (NIH) to study CMV virema among children diagnosed with an HIV infection while critically ill to determine the impact of CMV on mortality, duration of hospital stay, response to ART initiation, and immune activation and inflammation. She also received funding from the NIH to evaluate mother to child transmission of CMV among HIV infected and uninfected mother and infant pairs. Analysis among both of these studies will support a knowledge base for understanding CMVs role and contribution to morbidity and mortality among critically ill children in resource-limited settings.

Pediatric HIV and co-infections, like tuberculosis (TB), can leave ill children particularly vulnerable. Global WACH scientists published several papers this year that point to better tools for identifying children with life threatening HIV/TB co-infection who may be missed by a traditional screening. A paper entitled “Urine Tuberculosis Lipoarabinomannan Predicts Mortality in Hospitalized Human Immunodeficiency Virus-Infected Children” showed that HIV-positive children who had a positive urine lipoarabinomannan (LAM) indicating a TB were almost 5-times as likely to die than children with negative LAM-testing. Another paper explored the use of stool samples to diagnose TB in hospitalized HIV-infected children. In their study, Drs. Sylvia LaCourse and Patricia Pavlinac of Global WACH compared three specimen types for diagnosis of TB in HIV infected children: sputum, urine, and stool. They found TB tests using the easier to collect stool and urine samples had similar abilities to detect TB when compared to the traditional sputum
sample. Because children have difficulty producing sufficient sputum for testing, this finding may assist in the rapid detection of TB in HIV-infected children allowing for earlier initiation of potentially life-saving treatment.

With the success of prevention of maternal to child transmission of HIV, the majority of children born to mothers with HIV will be HIV-negative. Despite avoiding HIV infection, these infants are at high risk of *M. tuberculosis* (MTb) infection that can quickly progress to TB disease in the first year of life. Global WACH investigators and collaborators are investigating whether isoniazid (a drug that is known to reduce the risk of progression from Mtb infection to TB disease) can prevent primary Mtb infection in HIV-exposed infants in Kenya in the Thrasher Research Foundation supported infant TB Infection Prevention Study (iTIPS). The investigators hope to gain insights into potential TB prevention strategies as well as a better understanding of epidemiologic and immunologic factors associated Mtb infection in early life among HIV-exposed children.

Children who are critically ill in hospitals in resource-limited settings need to be diagnosed and treated accordingly as quickly as possible to prevent unnecessary infant and child deaths. This year Global WACH scientists made strides in making scientific discoveries and informing policies and guidelines to bring this vulnerable group of children the best possible care.
Adolescents have unique healthcare needs and it is no different for adolescents living with HIV in Kenya. Global WACh has its roots in Kenya with deep collaborations in scientific research focused on HIV. This year the Center had several exciting developments in research focused on making engagement in HIV care relevant and responsive to adolescent needs.

The DASH study, led by Drs. Pamela Kohler and Jennifer Slyker, focused on ways to make adolescent HIV testing acceptable, focusing on the voices and experiences of adolescents themselves. In a publication entitled “At our age, we would like to do things the way we want:” a qualitative study of adolescent HIV testing services in Kenya” Global WACh investigators conducted qualitative interviews with HIV-positive and negative adolescents, health workers, and caregivers in Nairobi on the topic of HIV testing. They found that respectful and informed care by a provider helped adolescents to get an HIV test, link to care, and return for repeat testing. By contrast, providers who were perceived as dismissive or judgmental discouraged adolescent testing. Knowing that positive provider interactions with adolescents are vital for successful HIV testing and care, Drs. Anjuli Wagner and Cyrus Mugo and their team set out to test if a quality improvement project for health care workers involved in HIV testing among adolescents would be effective. The team found that this intervention led to improved adolescent HIV knowledge. In the DASH study, adolescents also shared stories about how much it costs them to come for free HIV testing, as well as the changing roles of parents, peers, and partners in deciding to test for HIV and actually coming to a clinic.

Global WACh researchers are also exploring how social media can be leveraged to engage adolescents in HIV care. In newly awarded grant by the National Institute of Health, Drs. Brandon Guthrie and Keshet Ronen, and Irene Inwani will develop and pilot a mHealth framework using a combination of peer support and individual communication with a healthcare provider trained in youth HIV care. The study, named mPACT, will use the popular WhatsApp platform to help teens with HIV to access support during the risky period of transition from pediatric to adult HIV care. This study will build on the team’s previous work in the Vijana-SMART study, a Center for AIDS Research (CFAR) New Investigator Award that is developing an interactive WhatsApp group intervention to improve adolescent retention in HIV care and adherence to their HIV medication.

Drs. Grace John-Stewart, Jared Baeten, and Dr. John Kinuthia lead the PrEP Implementation for Young Women and Adolescents (PriYA) and the PrEP Implementation in Mothers in Antenatal Care (PriMA) studies that aim to determine best practices for providing PrEP, a daily pill that can prevent the acquisition of HIV, to young women and pregnant and postpartum women. Many adolescents and young women do not know their partner’s HIV status and cannot negotiate condom use with their partners. In qualitative studies led by Drs. Jillian Pintye and Kristin Beima-Sofie, women
expressed strong interest in PrEP but acknowledged that there may be challenges in taking PrEP, including community stigma and negative reactions from male partners, as well as challenges distinguishing side effects of PrEP from normal pregnancy symptoms. The PriYA Program rolled out in 16 maternal and child health and family planning clinics across Kenya this year and has scaled up the offer of PrEP to over 20,000 young women, which led to over 4,000 women who initiated PrEP. The PriYA team is the first program in the world to target PrEP delivery to pregnant women at risk for HIV, and was highlighted by the United States President’s Emergency Plan for AIDS Relief (PEPFAR) as an effective PrEP implementation program. Data from PriYA was presented in 2 oral presentations at the AIDS 2018 meeting in Amsterdam and a recently published article in JAIDS.

Building tools to support women’s reproductive health decisions

Every person should have access to the tools and information they need to make informed choices about their reproductive health. Global WACH’s family planning decision support group has been working this year to understand women’s needs for contraceptives, community support for using family planning, and reasons for discontinuing a contraceptive method. With 214 million women worldwide with an unmet need for family planning, this information is critical to help support women to make healthy choices that align with their fertility goals.

Global WACH researchers published findings this year from their studies in Kenya on needs for family planning following the birth of a child. Family planning during the postpartum period is extremely important to allow women to space pregnancies if they choose. Pregnancies that are spaced too close together, especially within six months after giving birth, carry elevated risks for the next child including low birth weight and premature birth. In their paper “Uptake and correlates of contraception among postpartum women in Kenya: results from a national cross-sectional survey” Global WACH researchers found that only two thirds of the women in their study identifying a need for family planning used effective contraception at nine months following birth, leaving one third with an unmet need. A major finding was that discussing family planning options during postnatal care was positively associated with uptake of family planning. The team concluded that integrating family planning counseling into antenatal and postnatal care may help close the gap in unmet need for family planning among this group of women. In another publication, Global WACH researchers found that motherhood increased support for family planning among Kenyan adolescents. Although they cited a lack of knowledge, misinformation, and insufficient counseling and time with providers as barriers to family planning use,
adolescents who transitioned to motherhood in this study felt they were more encouraged to use family planning and showed increased awareness of the benefits of family planning.

Our study teams are also looking to leverage technology to develop effective tools and better understand how women make reproductive health choices. In her mCUBE study, Dr. Alison Drake collected information from women using modern family planning methods in Kenya through a survey completed by mobile phone. Leveraging cell phone technology, the mCUBE team collected information by text message on side effects, symptoms, and reasons for discontinuation of a family planning methods from women in Kenya. This data will describe the untold stories of women who discontinue family planning methods but do not return to clinic to speak with a healthcare provider. When complete, the mCUBE study will provide essential information to inform approaches for increasing method retention with family planning for women who want to prevent pregnancy.

Mobile WACH, our mhealth platform that remotely connects women to healthcare providers through interactive text messaging, had major findings from its first trial published this year in BJOG, an international journal of obstetrics and gynecology. The findings from the Mobile WACH trial showed that the SMS platform improved practice of exclusive breastfeeding and early postpartum contraception among postpartum women. This study is particularly exciting given the expansion of the Mobile WACH platform over the past few years across the Global WACH research portfolio as a tool to help women and their partners engage in many types of healthcare. Mobile WACH NEO, an evolution of the Mobile WACH platform to assist mothers in providing newborn care, also had several exciting developments this year as it seeks to scale the program nationally in Kenya. Led by Dr. Jennifer Unger, the Mobile WACH NEO team enrolled over 800 women into a demonstration project, completed costing estimates for the program at scale, forged new partnerships with telecom providers, and worked closely with officials from the Kenya Ministry of Health to ensure the program is aligned to national health priorities.

Mobile WACH XY used the platform to educate and support couples through family planning uptake and continuation. A rigorous trial found that participation in the program led to significantly increased rate of highly effective family planning methods. The result of this trial will be presented at the International Family Planning Conference in Kigali, Rwanda and is currently under peer review for publication. Ultimately, our team hopes to develop and scale tools that give women and their partners complete and culturally relevant information to make informed decisions about family planning.
A New Generation of Global Health Leaders in WACH

WACH Graduate Student Certificate Program

The Global WACH Certificate is offered to UW graduate and PhD students seeking to specialize in the needs of women, adolescent, and child health. The program provides opportunities for interdisciplinary learning through diverse coursework, workshops, and a capstone project requirement.

Dr. Alison Drake leads monthly meetings to expand students’ skillset and knowledge in a range of WACH topics. This year the Certificate had 32 students enrolled in the program, the largest cohort to date. At Global WACH’s “Next Big Thing” event, eight graduating students presented capstone posters on topics ranging from conducting a cost analysis of a mobile health platform in Kenya, to evaluating best practices to scale up a self-injection contraception in Uganda, to providing a situational analysis of infant feeding behavior and religious fasting in Ethiopia.

Certificate Student Profile: Miriana Duran and Brenda Kharono

Miriana Duran and Brenda Kharono, a medical doctors from Mexico and Uganda, respectively, completed their first year as Master of Public Health and Global WACH Certificate students. They share interests in investigating the challenges and solutions to improving babies’ access to human milk and lactation support in health systems as part of their studies. For their Global WACH capstone project and summer internship at PATH, Brenda and Miriana visited The Northwest Mothers Milk Bank in Portland, Oregon, a non-profit organization that aims to promote, protect and support breastfeeding and provide breastmilk to local babies in need. Their visit drew them deeper into the complex processes and steps involved to rigorously screen donors, comply with human milk pasteurization and storage guidelines, and make breastmilk more accessible locally and internationally. Their research led to the conclusion that more strategic
efforts are needed to harmonize health care provider involvement in provision of lactation support and potential breast milk donation. As incoming second year students, Miriana and Brenda are eager to continue learning about feasible, alternative solutions to reduce systematic barriers to breastmilk and lactation support to vulnerable populations.

Working Groups, Lectures and Workshops

Global WACH is home to seven working groups that engage over 200 members around topics related to woman, adolescent, and child health. This year, The Global Health Data Toolkit Working Group, which aims to creating a high quality, detailed repository of data collection forms available to Global WACH and CFAR Adolescent Health Scientific Working Group collaborators, re-invigorated their activities.

In addition to their regular activities, our Working Groups host annual symposiums that bring together leaders in their field and showcase speakers on emerging topics of interest. In December 2017, the Family Planning Working Group held its second half-day “Family Planning Mini Symposium” at the University of Washington to focus on key emerging areas of within family planning and reproductive health. Speakers included researchers from PATH and the university’s Departments of Epidemiology, Global Health, Medicine, and Obstetrics and Gynecology. Winn Brown, Senior Program Officer of the Bill & Melinda Gates Family Planning Strategy Division, gave the keynote address to 40 attendees.
LECTURES, WORKSHOPS, AND CONFERENCES

In 2017-2018, Global WACh hosted eight sessions as part of the “Breakfast with WACh Lecture Series.” Invited speakers came from the Bill & Melinda Gates Foundation, Oregon Health and Sciences University, University of Oxford, University of Virginia Medical School, University of Washington, and World Health Organization. Session topics included improved TB diagnostic and vaccines for children, pediatric enteric infections, ethical research conduct in vulnerable populations, how to stop violence against women in a sexual reproductive health context, and improving maternal and newborn care through maternal immunizations. The lectures drew a total of 142 attendees.

This year, Global WACh resumed its Skills Series workshops, which are offered to Department of Global Health graduate and PhD-level students with some exposure to health research in a local or global context. Drs. Brandon Guthrie and Keshet Ronen led three workshops (Introductions to Data Management, Open Data Kit, and REDCap) as part of Global WACh’s “Intro to Data Management Series,” designed to help research staff and students develop skills with methodologies, data platforms, and data sets commonly used by research teams at the University of Washington and beyond. The last workshop of the series, “Analyzing DHS Data,” was led by Anita Rocha, Data Manager and research analyst from the School of Social Work.

Global WACh leveraged local and international conferences to disseminate their scientific findings and network with other collaborators in their research field. In November 2017, researchers from the Global WACh Gut Health and Child Survival team attended the 66th American Society of Tropical Medicine and Hygiene (ASTMH) Conference in Baltimore, Maryland. In December 2017, the Global WACh Gut Health & Child Survival priority area and the Center for Microbiome Sciences & Therapeutics co-hosted the Microbiome Symposium at the University of Washington. At PATH Drug Development's Symposium on Innovative Therapeutics for Cryptosporidium in Seattle in March, Dr. Patricia Pavlinac presented findings on a potential link between cryptosporidium infections and living in the same household with a HIV-positive caregiver. In July 2018, Global WACh researchers had a strong presence at the International AIDS Conference in Amsterdam to share and discuss a number of selected abstracts. Several researchers also participated in the pre-conference event, the 10th Workshop on HIV Pediatrics, where eight selected poster abstracts were featured. Concurrently, Dr. Jennifer Unger, Principal Investigator of the Mobile WACh NEO project presented on stage at the Saving Lives at Birth Grand Challenges conference in Washington D.C.
The Global WAC Unit Leadership Team drives discovery, leadership development, and collaboration with innovators and researchers form a broad range of disciplines. A list of the Global WAC Unit Leadership Team is below:

**Maneesh Batra, MD**  
Associate Director  
Pediatrics

**Alison Drake, PhD, MPH**  
Scientific Priority Lead  
Family Planning Decision Support

**Stephanie Edlund-Chow, MSW**  
Program Coordinator

**Brandon Guthrie, PhD, MPH**  
Leadership Development Lead

**Grace John-Stewart, MD, PhD, MPH**  
Center Director

**Sylvia LaCourse, MD**  
Scientific Priority Lead  
HIV and Co-Is Through the Lifecycle

**Patricia Pavlinac, PhD**  
Scientific Priority Lead  
Gut Health & Childhood Survival

**Kate Pfizenmaier, MPA**  
Program Manager  
Center Operations

**Jennifer Slyker, PhD**  
Scientific Priority Lead  
HIV and Co-Is Through the Lifecycle

**Alyson Shumays, MPH**  
Manager of Program Operations  
Gut Health & Child Survival

**Jennifer Unger, MD**  
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**Anjuli Wagner, PhD, MPH**  
Scientific Priority Lead  
HIV and Co-Is Through the Lifecycle

**Judd Walson, MD, MPH**  
Scientific Priority Lead  
Gut Health & Child Survival