

BREAK THE CYCLE ¹⁰

BREAK THE CYCLE OF ENVIRONMENTAL HEALTH DISPARITIES IN CHILDREN

APRIL 23-24, 2015

ROLLINS AUDITORIUM, 1ST FLOOR
HEALTH SCIENCES RESEARCH BUILDING, EMORY UNIVERSITY
1760 HAYGOOD DRIVE NE, ATLANTA, GEORGIA 30322

A PROJECT OF:

Southeast Pediatric Environmental Health Specialty Unit at Emory

Innovative Solutions for Disadvantage & Disability

Georgia Council on Developmental Disabilities

Sustainability Initiatives at Emory University



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THURSDAY APRIL 23, 2015

OPENING

- 8:00 A.M. Registration and Continental Breakfast (sponsored by Sustainability Initiatives at Emory University)
- 8:30 A.M. Introductory Remarks
Robert Geller, MD and Michael Hatcher, DrPH
- 8:45 A.M. Introduction to Break the Cycle,
Leslie Rubin, MD

ENVIRONMENT & HEALTH

- 9:15 A.M. **Endocrine Modulation & Metal Exposure: Long Term Effects on the Children of Agricultural Working Mothers in Thailand.**
Grant Walter, student, Dr. Dana Boyd-Barr, mentor, Rollins School of Public Health of Emory University, Department of Environmental Health
- 9:35 A.M. **Racial and SES Disparities in Populations Surrounding Nuclear Power Plants** Student: Christina Sauer Mentor: Pamela J. Maxson PhD, Children's Environmental Health Initiative School of Natural Resources and Environment *University of Michigan, Ann Arbor*
- 9:55 A.M. **Impact of Housing on Body Size & Pubertal Timing.**
Farah Dahdabhoy, student, Dr. Maida Galvez, mentor, Icahn School of Medicine at Mount Sinai, Departments of Preventive Medicine and Pediatrics
- 10:15 A.M. **An assessment of the Relationship Between Environmental Risk Factors and Malnutrition in Children Born from Teenage Mothers in Chipata Compound of Lusaka District.**
Chalwe Chanda, student, Nosiku Sipilanyambe Munyinda, mentor, University of Zambia School of Medicine, Department of Public Health

10:35 A.M. HEALTH BREAK

- 10:50 A.M. **Environmental Factors That Triggers Asthma in African-American Children in Low-Income Communities in Fort Valley, GA.**
Jasmine Williams, student, Dr. Saul Mofya, mentor, Fort Valley State University, Dept. of Veterinary Science and Public Health
- 11:10 A.M. **Home Environment, Low-Income Children and Primary Care Medical Homes**
Xin Hu, student, Dr. Laurie Gaydos, mentor, Rollins School of Public Health at Emory University, Department of Health Policy and Management

ECONOMICS AND HEALTHCARE

- 11:30 A.M. **The Determinants of Access to Healthcare Services in Georgia.**
Shruthi Satyamurthy, student, Dr. Daniel Montanera, mentor, J. Mack Robinson College of Business, Georgia State University

11:50 A.M. LUNCH

- 1:20 P.M. **Guest Speaker:**
Maria Jose Moll, MD, MSc,
Pediatric Environmental Health Specialty Unit, Montevideo, Uruguay
Tackling Lead Poisoning and Community Intervention

- 1:50 P.M. **Keynote Speaker:**
Bruce Lanphear, MD MPH
Simon Fraser University, Vancouver BC
Crime of the Century: Our Failure to Prevent the Lead Pandemic.

- 2:50 A.M. **HEALTH BREAK** (Afternoon dessert break--baked and donated by Deb Eike)

MAKING A DIFFERENCE

- 3:10 P.M. Mitigating Effects of Positive Learning Environment on Early Life Exposure to ETS on Neurodevelopment in Children.**
Madeleine Hopson, student, Dr. Julie Herbstman, mentor, Columbia Mailman School of Public Health, Department of Environmental Health Sciences
- 3:30 P.M. The Family Check Up in a Pediatric Clinic: An Integrated Care Delivery Model to Improve Child Behaviors in the Home Environment.**
Courtney Smith, student, Dr. Karen Schetzina, mentor, East Tennessee State University Department of Pediatrics
- 3:50 P.M. Implementing Community Supports to Lessen Health Disparities at Kindergarten Entry for Preterm Infants.**
Amelia Dmowska, student, Dr. Michael Msall, mentor, University of Chicago Medicine-Comer Children's Hospital
- 4:10 P.M. Closing Health Disparities Through a Multi-Level Approach.**
Naeemah Ruffin, student, Dr. Cappy Collins, mentor, SUNY Stony Brook, Center of Excellence in Children's Environmental Health at Stony Brook

CLOSING

- 4:30 P.M.** Summation, Leslie Rubin, MD.
- 5:00 P.M.** Adjourn

FRIDAY APRIL 24, 2015

THE COST BENEFIT OF BREAKING THE CYCLE OF CHILDREN'S HEALTH DISPARITIES

- 8:00 A.M.** Breakfast (sponsored by Sustainability Initiatives at Emory University & Georgia Council on Developmental Disabilities)
- 8:30 A.M.** Opening Introductions.
Leslie Rubin, MD
- 8:40 A.M. Asthma & Housing**
Sylvia Caley, JD, MBA, RN
- 8:55 A.M. Primary & Secondary Prevention with Intellectual & Developmental Disabilities**
David Ervin, PhD
Joav Merrick, MD, MMedSci, DMSc
- 9:20 A.M. Early Intervention with Infants Born Prematurely**
Michael Msall, MD
- 9:50 A.M. HEALTH BREAK**
- 10:00 A.M. The Staggering Burden of Lead Toxicity and the Unbelievable Benefits of Preventing It**
Bruce Lanphear, MD, MPH
- 10:30 A.M. BREAK-OUT DISCUSSIONS**
- 11:00 A.M. LARGE GROUP DISCUSSIONS OF FINDINGS**
- 11:30 A.M.** Concluding Remarks
Leslie Rubin, MD.
- 11:55 A.M.** Adjourn

GUEST PRESENTERS

National University, School of Medicine
Montevideo, Uruguay
María José Moll, MD, MSc.

Dr. Maria Jose Moll studied Medicine with a specialty in Pediatrics at the National University of Uruguay; received a MSc. in Nutrition with an emphasis in Public Health, and completed postgraduate training in Food Technologies, focused on pesticides and food contaminants, at the Catholic University of Uruguay. Dr. Moll has also taken postgraduate distance learning courses in Nutritional Assessment from the University of Chile. She works at the PEHSU in the School of Medicine of the National University and as a Primary Health Care Pediatrician with the City of Montevideo. She also teaches nutrition at the Masters program of the Catholic University and teaches medical students and residents in Toxicology and Pediatrics at the National University. Her work has focused on pediatric environmental pollutants, with an emphasis in lead poisoning. In 2005, Dr. Moll received the National Award of Medicine and in 2012 the Ministry of Health Award, both from the National Academy of Medicine of Uruguay.

Child & Family Research Institute, British Columbia Children's Hospital
Simon Fraser University
Vancouver, British Columbia

Bruce Lanphear, MD, MPH, is a Clinician Scientist at the Child & Family Research Institute, BC Children's Hospital and Professor in the Faculty of Health Sciences at Simon Fraser University in Vancouver, British Columbia. His primary goal is to help quantify and ultimately prevent disease and disability - like asthma, learning problems and ADHD - due to exposures to environmental contaminants and pollutants. Over the past decade, Dr. Lanphear has become increasingly vexed by our inability to control the "pandemic of consumption" - the largely preventable, worldwide epidemic of chronic disease and disability due to industrial pollutants, environmental contaminants and excess consumption. He is leading an effort to build an online Atlas of Environmental Health to enhance public understanding of how environmental influences impact human health.

Georgia State University College of Law
Sylvia Caley, JD, MBA, RN

Sylvia Caley is an associate clinical professor at Georgia State University College of Law, teaching law students and other professional graduate students enrolled in the HeLP Legal Services Clinic. She also teaches Health Legislation and Advocacy, a year-long course in which law students work with community partners to address health-related legislative and regulatory issues affecting the community. She is the director of the Health Law Partnership (HeLP), interdisciplinary community collaboration among Children's Healthcare of Atlanta, the Atlanta Legal Aid Society, and the College of Law. She is a member of the Ethics Committees at Grady Health System and Children's Healthcare of Atlanta. Her research interests focus on using interdisciplinary and holistic approaches to address the socio-economic and environmental issues affecting the health and well-being of children, specifically the lives of low-income, chronically ill, and disabled children.

The Resource Exchange
Colorado Springs, Colorado
David Ervin, BSc, MBA

David Ervin, BSc, MBA, is CEO of The Resource Exchange, a Colorado-based nonprofit serving children and adults with intellectual and developmental disabilities (IDD). He has extensive professional experience in the IDD industry, having worked in and/or consulted to organizations in the US and abroad. He is a published author and speaks internationally on healthcare for people with IDD and other areas of expertise. David is Associate Editor for the journal *Frontiers in Public Health*, a member of the State of the States in Developmental Disabilities National Advisory Council, and a Governor's appointee to and elected Chair of the Colorado State Board of Human Services. He is also an appointed member of the International Professional Committee of Beit Issie Shapiro in Israel, a member of the International Advisory Committee for the National Institute for Child Health and Human Development in Israel, and is on the International Scientific Committee for the The Gerry Schwartz and Heather Reisman 4th International Conference on Pediatric Chronic Diseases, Disability and Human Development.

David's current research interests includes health promotion and disease prevention for people with IDD. He is co-Principal Investigator on a Rehabilitation Research and Training Center (RRTC) on Developmental Disabilities and Health project, in partnership with University of Illinois at Chicago, funded by the National Institute on Disability and Rehabilitation Research that examines the use of technology to support diet, nutrition and physical activity interventions for obese adults.

JP Kennedy Research Center on Intellectual & Developmental Disabilities
University of Chicago Medicine Comer Children's Hospital
Michael E. Msall, MD

Michael Msall, MD, is the Chief of Developmental and Behavioral Pediatrics at The University of Chicago Comer Children's Hospital and Professor of Pediatrics at Pritzker School of Medicine. He is also the Co-Director of the JP Kennedy Research Center on Intellectual and Developmental Disabilities. Dr. Msall specializes in the diagnosis and treatment of developmental, behavioral and learning problems in infants and children. He also is highly involved in the training of pediatric residents and fellows in developmental and behavioral pediatrics and the development of interdisciplinary care for underserved children at highest risk for neurodevelopmental disabilities. In his practice over the past 30 years, Dr. Msall has worked to optimize outcomes across the life course for children, adolescents and adults with prematurity, autism, cerebral palsy, Down syndrome, intellectual disability, and genetic disorders.

CONFERENCE PARTICIPANTS

EMORY UNIVERSITY ROLLINS SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF ENVIRONMENTAL HEALTH

Student

Grant Walter

Grant Walter is currently completing his MPH in the Environmental Health at Rollins School of Public Health. Grant has an extensive background in molecular biology and biochemistry techniques in bench science in multiple medical disciplines including: Cardiology, Obstetrics & Gynecology and Infectious Disease. He has worked as a graduate research assistant in the Integrated Health Sciences and Facilities Core, HERCULES Environmental Health Center focused on quantifying biomarkers of exposure using analytical chemistry techniques. He has also worked for the Centers for Disease Control and Prevention in the Clinical Chemistry Branch utilizing similar analytical chemistry techniques. Through his experiences, Grant's interests pertain to environmental transport and environmental fate of chemicals and the subsequent risk that is created through exposure in combination of analytical chemistry techniques. He is also interested in using these techniques in the context of maternal exposure and the long term effects on children associated with these exposures. After completion of his degree, He wishes to delve into air and water transport of chemicals for inclusion into larger epidemiologic studies.

Faculty Mentor

Dana Boyd Barr, PhD

Dr. Dana Boyd Barr is a Professor of Exposure Science and Environmental Health at Emory University's Rollins School of Public Health, Department of Environmental Health. Although she has been in academia for just five years, she has worked to successfully establish a team of cohort studies evaluating maternal-child health, paternal reproductive health, and farmworker safety in Thailand. She is also collaborating on several child and farmworker cohorts in the United States and Mexico. Prior to joining Emory, Dr. Barr was employed at the Centers for Disease Control and Prevention for 23 years. During her tenure at CDC, she devoted much of her time to the development of methods for assessing human exposure to a variety of environmental toxicants including current-use pesticides, phthalates, organochlorine chemicals (pesticides and PCBs), phytoestrogens, diethylene glycol, methyl eugenol, vinyl chloride and others. Dr. Barr has authored or coauthored over 300 peer-reviewed publications, book chapters and many published abstracts. She is a past President of the International Society of Exposure Science (ISES) and former Editor-in-Chief (now Editor Emeritus) of its flagship journal, Journal of Exposure Science and Environmental Epidemiology. She is also an associate editor of Environmental Health Perspectives and Environmental Research and serves on the editorial board of the Journal of Chromatography & Separation Techniques, Journal of Health Research, and Advances in Medicine. Dr. Barr has received many awards including ISES's Daisey Award for Outstanding Investigator, two HHS Secretary's awards for exposure-health investigations involving diethylene glycol and methyl parathion poisoning, 2004 Federal Scientific Employee of the Year, CDC's Mackel Award for outstanding collaboration among epidemiology and laboratory,

and EPA's Silver Medal for outstanding contributions to the development of protocols for the National Children's Study. Most recently, she was named by Thomson Reuters as a 2014 Top Cited Researcher for 2002-2012 representing the top 1% of researchers in environment/ecology areas. Dr. Barr received her BS in Biology from Brenau University in 1987 and her Ph.D. in Analytical Chemistry from Georgia State University in 1994.

UNIVERSITY OF MICHIGAN SCHOOL OF NATURAL RESOURCES AND ENVIRONMENT

Student

Christina Sauer

Christina Sauer is a graduate student at the University of Michigan's School of Natural Resources and Environment in the Environmental Justice track. She is a graduate from Brown University with a Bachelor of Arts degree in Environmental Studies. Christina is currently a graduate research assistant at the Children's Environmental Health Initiative. After witnessing her sister battle with brain cancer, she was driven to educate the general public about toxic agents in their local environments through creative and engaging mediums. Her undergraduate capstone project was an environmental theatre program for high school students that focused on the effects of local Superfund/brownfield sites and coal mining on students in Rhode Island and Kentucky. She is currently developing a documentary on racial and socioeconomic disparities surrounding industrial facilities throughout the US. Through her Break the Cycle project, she hopes to generate awareness of the at-risk populations surrounding nuclear power plants and call for a change in radiation protection standards.

Faculty Mentor

Pamela J. Maxson, PhD

Dr. Pamela Maxson is the Research Director for the Children's Environmental Health Initiative at the School of Natural Resources and Environment at the University of Michigan. Dr. Maxson received her B.S from the University of Hawaii, and her M.S. and Ph.D. in Human Development and Bio-behavioral Health from Pennsylvania State University. Her research interests include reducing health disparities and the social context of environmental exposures.

MOUNT SINAI UNIVERSITY ICAHN SCHOOL OF MEDICINE

Student

Farah Dhadabhoy

Farah Dadabhoy is a second year medical student at University of Cincinnati College of Medicine. She received her B.S from Duke University, where she had the opportunity to gain exposure to environmental health disparities and further solidify this interest by participating in Break the Cycle 6. Through her second Break the Cycle project, Farah aims to examine and delineate the role of housing on pubertal timing. Her research suggests that housing quality may be associated with earlier onset of puberty in certain minority subgroups. As the project progresses, she hopes to underscore the importance of providing inner city girls with quality housing.

Faculty Mentor

Maida Galvez, MD

Dr. Maida P. Galvez is a Pediatrician and an Associate Professor in the Departments of Preventive Medicine and Pediatrics at Icahn School of Medicine at Mount Sinai in NY. She directs the Region 2 Pediatric Environmental Health Specialty Unit and practices General Pediatrics. She leads a project entitled "Growing Up Healthy in East Harlem," a community based project examining the role of the environment in childhood obesity. She is also Co-Investigator in the NIEHS/NCI funded Breast Cancer and the Environment Research Program assessing environmental determinants of puberty in girls. Dr. Galvez is currently a member of EPA's Scientific Advisory Board, the NCEH/ATSDR funded National Environmental Health Partnership Council and is District 2 Chapter 3 President of the American Academy of Pediatrics.

UNIVERSITY OF ZAMBIA SCHOOL OF MEDICINE ENVIRONMENTAL HEALTH UNIT

Student

Chalwe Chanda

Chalwe Chanda is a final year student pursuing a Bachelor of Science degree in Environmental Health at the University of Zambia – School of Medicine, Ridgeway Campus. Mr. Chanda hopes that his participation in the Break The Cycle 10 will go a long way in improving the quality of life for the disadvantaged children in his country and beyond. His professional and career goals include obtaining a Doctor of Philosophy in Public Health, and also venturing into Community Participatory Health Research.

Faculty Mentor

Nosiku Munyinda

Nosiku Munyinda is a qualified Environmental Engineer and Natural Resources Management Scientists who is finalizing a PhD in Public Health focusing on DDT and Neurodevelopment outcomes in children of Zambia. She began her working career at the Environmental Council of Zambia and was tasked with licensing and compliance monitoring of all Pollution Prevention and Control related activities. In her current position, she is part of team in the Public Health Department and is responsible for the Pollution Control pillar of the Environmental Health programme and coordinates and teaches various courses under this section. She also supervises final year students in their research courses. Mrs. Munyinda also coordinates and teaches the Pollution Control course in the Masters of Public Health- Environmental Health stream among others. In addition, Mrs. Munyinda has extensive experience in training and capacity building of an assortment of stakeholders in knowledge and skills related to Sound Management of general waste, healthcare and all other types of hazardous waste, Environmental Impact Assessment, Strategic and Health Impact Assessments, Trade and Environment, Cleaner Production. She has undergone training and undertaken review of Environmental Impact Statements (EIS'), Auditing and Strategic Environmental Assessment of various projects both in Zambia and Capetown in South Africa. She is also proficient and has trained different groups in monitoring of various environmental media such as food, water, air, soil and the human environment. She is a qualified participatory rural appraiser and has further worked widely with both urban and rural communities and trained local people both in Zambia and South Africa in facets of Environmental Management.

FORT VALLEY STATE UNIVERSITY DEPARTMENT OF VETERINARY SCIENCE AND PUBLIC HEALTH

Student

Jasmine Williams

Jasmine Williams is currently a graduate student at Fort Valley State University, College of Graduate Studies and Extended Education, pursuing her Masters of Public Health in Environmental Health. She plans to graduate in December of 2015. Jasmine received her Bachelor of Science in Biology from Fort Valley State University in 2009. She has completed multiple research projects pertaining to environmental health. Her two favorite research projects include: An Analysis of Canadyne's Superfund Site: Toxic Materials that are Associated with Health Defects and The Suppression of Plant Pathogens with Entomopathogenic Bacterial Metabolites. Jasmine's interest stem from a desire to understand and bring awareness to minority communities that are affected by environmental health disparities. These two projects taught her that there is a great need of a "voice" about environmental health disparities in minority communities. Mrs. Williams' hopes to be an advocate for these underprivileged communities as an environmental toxicologist.

Faculty Mentor

Saul Mofya, DVM

Dr. Saul Mofya is an Assistant professor of Veterinary Medicine and Public Health at Fort Valley State University, Fort Valley, Georgia. He received is D.V.M from University of Zambia in 2001 and eventually earned his Master's degree in Veterinary Microbiology at St. George's University, Grenada in 2008. Dr. Mofya teaches undergraduate students in Veterinary Technology program and graduate students in public health. In addition to teaching, Dr. Mofya is involved in research and community outreach. Dr. Mofya has been involved in several researches and publications in Veterinary Medicine. His major interests involve one health one medicine and public health and awareness in disadvantaged communities.

EMORY UNIVERSITY ROLLINS SCHOOL OF PUBLIC HEALTH

Student

Xin Hu

Xin Hu is a second-year MSPH student in the Department of Health Policy and Management at Emory University Rollins School of Public Health. She is currently a Graduate Research Assistant (GRA) at the Emory Prevention Research Center, and the Behavioral Research Center at the American Cancer Society. She received her bachelor degree in Public Health Administration at Fudan University School of Public Health in 2013. Her research interests include the primary care delivery system and healthcare access among minority populations, cancer prevention and control focusing on nutrition, physical activities and other health-related behaviors, as well as health outcomes and quality of life. She plans to obtain her PhD in Health Services Research, and pursue a career in academic institutes or governmental research agencies.

Faculty Mentor

Laurie Gaydos, PhD

Dr. Laurie Gaydos is an Assistant Professor of Health Policy & Management in the Department of Health Policy and Management at Emory University, Rollins School of Public Health. She is also Associate Chair for Academic Affairs for the Executive MPH Program at Emory. Dr. Gaydos received her AB in Public Policy from Brown University in 1998 and her PhD in Health Policy and Administration at the University of North Carolina at Chapel Hill in 2004. Dr. Gaydos' work focuses in the areas of unintended pregnancy prevention/reproductive health, religion and reproductive health, women's fitness and nutrition, racial disparities in women's health, and legislative advocacy for women's health.

GEORGIA STATE UNIVERSITY J. MACK ROBINSON COLLEGE OF BUSINESS

Student

Shruthi Satyamurthy

Shruthi Satyamurthy is a graduate student pursuing her MBA/MHA degree. She is a dentist from India and worked both as a clinician in a dental office and a medical claims officer at an insurance company before heading to United States for higher studies. In addition to her coursework, she acts as a graduate research assistant to Dr. Abhay Mishra, Associate Professor, in the Department of Healthcare Administration at Georgia State. She is also a student intern practicing clinical decision support at Grady hospitals. She was motivated to conduct this research project due to her initial research work on: What is one of the most important reason for the differences in life expectancy between the African-American population and the Caucasian population? One of the leading answers to this question was racial residential segregation, which encouraged her to probe deep into the causal relation between racial concentration and access to care.

Faculty Mentor

Daniel Montanera, PhD

Dr. Daniel Montanera uses game theory and principal-agent theory to model the interactions between health insurers and providers. Specifically, he studies the effects of medical malpractice liability costs on the cost and quality of consumer health insurance. His latest research investigates the potential role of competitive bidding in mitigating provider risk selection. Professor Montanera is active in preparing GSU student representatives to compete in annual national health administration case competitions, including the NAHSE Student Case Competition and the UAB Health Administration Case Competition. Prior to his work at GSU, Professor Montanera pursued graduate studies in Economics at Queen's University and the University of Western Ontario in the fields of health economics, public economics, and microeconomic theory. At GSU, Professor Montanera teaches courses in undergraduate health care systems and both graduate and undergraduate health economics.

COLUMBIA UNIVERSITY MAILMAN SCHOOL OF PUBLIC HEALTH

Student

Madeleine Hopson

Madeleine Hopson is currently a Masters of Public Health student at Columbia University's Mailman School of Public Health, studying Environmental Health Sciences with a certificate in Molecular Epidemiology. She graduated with a Bachelor of Arts in Economics and Psychology from McGill University in Montréal, Canada in 2012 and plans to earn an M.D. from Columbia University College of Physicians and Surgeons in 2019 and enter into the field of Oncology. Her primary research interests include disparities in causes and treatments of cancer in minority populations and the development of personalized cancer treatments. She also works for Columbia University's IFAP Global Health Program, in which she helped develop a 12-week global health lecture series and was a student leader of a summer medical Spanish and cultural immersion program. In her free time, she volunteers as an art coach for Free Arts NYC, a program that uses visual arts to encourage creativity and create bonds between underserved families in Inwood, New York, plays basketball and soccer, and is training for her first half-marathon.

Faculty Mentor

Julie Herbstman, PhD, ScM

Dr. Julie Herbstman is an Assistant Professor in Environmental Health Sciences and Co-Director of the Molecular Epidemiology Certificate at the Columbia Mailman School of Public Health. She is an environmental and molecular epidemiologist whose research area focuses on the effects of prenatal exposures to environmental pollutants and the molecular mechanisms underlying these associations. She has been an investigator at the Columbia Center for Children's Environmental Health for the past 9 years and has expertise in the design, conduct and analysis of epidemiologic studies that include biomarker data. She is the director of a longitudinal birth cohort study of sibling pairs, which aims to identify exposure-related changes in the epigenome measured at birth and its relation to outcomes during childhood. She leads an NIEHS-funded study looking at the association between prenatal and childhood exposure to polybrominated diphenyl ethers, which are ubiquitous flame retardant compounds, and thyroid hormone dysfunction and neurodevelopment. She received her Masters of Science and Doctorate in Environmental Epidemiology from the Johns Hopkins Bloomberg School of Public Health in 2002 and 2006, respectively.

EAST TENNESSEE STATE UNIVERSITY QUILLEN COLLEGE OF MEDICINE

Student

Courtney Smith

Courtney Smith is a Ph.D. candidate in the Clinical Psychology program at East Tennessee State University with plans to complete her degree requirements in 2017. Courtney has training in the application of evidence-based treatments to address psychosocial, developmental and behavioral concerns in children and adolescents. Additionally, she has a strong interest and background in integrating mental healthcare services within primary care. She serves as an executive committee member of the ETSU's student-lead Association of Interprofessional Healthcare Students to improve partnership among emerging healthcare professionals. Recently, Courtney successfully completed a 2-year interprofessional training series that involved collaboration with multiple healthcare disciplines in didactic and experiential exercises. As part of her program's clinical training, she is currently serving as a behavioral health consultant in a pediatric primary care training clinic associated with the Quillen College of Medicine. In this role, she has been working to implement two new interventions aimed at enhancing the quality of care patients receive, a vast majority of which come from underserved populations. Her long-term career goals are to continue constructing innovative methods of meeting the psychosocial, developmental and behavioral needs of underserved children, as part of an integrated healthcare team.

Faculty Mentor

Karen Schetzina, MD, MPH, CLC, FAAP

Dr. Karen Schetzina is an Associate Professor and Director of Community Pediatrics Research at East Tennessee State University. Dr. Schetzina is currently the project director for state and federal grants awarded to East Tennessee State University for the ReadNPlay for a Bright Future project for supporting healthy active living among families with young children. She is Co-PI on a study investigating the feasibility and preliminary efficacy of adapting the evidence-based Family Checkup into an integrated primary care setting to address behavioral concerns and home environment in 4-5 year olds. She is also currently a State

Project Co-Leader of the Tennessee Initiative for Perinatal Quality Control Breastfeeding Promotion projects. As such, she has led development and implementation of toolkits and data systems for state QI projects in the prenatal, hospital/delivery, and outpatient settings in Tennessee. Dr. Schetzina recently completed an NIH R15-funded pilot clinical trial (Rural Clinic-Based Intervention on Child Overweight in Rural Appalachia) exploring the effectiveness of individual counseling and parent group visits for treating child overweight and obesity in primary care. She served as a member of the Expert Committee treatment writing group that developed and published recommendations for child and adolescent overweight and obesity in Pediatrics in 2007.

UNIVERSITY OF CHICAGO PRITZKER SCHOOL OF MEDICINE

Student

Amelia Dmowska

Amelia Dmowska is a third-year premedical student at the University of Chicago. In addition to working as a research assistant for Dr. Michael E. Msall in the Department of Behavioral and Developmental Pediatrics, she is also heavily involved in urban youth education. She is in charge of an organization called ArtShould, which provides 75-100 children per quarter with free afterschool art classes at five elementary schools on the South Side of Chicago. Through the national organization Peer Health Exchange, she also works with teenagers in Chicago public high schools and teaches weekly health classes on decision-making, communication, and mental health. She is interested in the impact of early intervention programs on children's future outcomes, and she will continue working in this area this summer by studying the impact of early language exposure on developing children as a research assistant for the Thirty Million Words Initiative. As a part of this evidence-based intervention, she hopes to help parents enrich their home language environment in order to optimize their child's ability to learn. This summer, she is also working to start a free arts and storytelling summer program called StoryArts for middle school students from underserved neighborhoods.

Faculty Mentor

Michael Msall, MD

Dr. Michael Msall is the Chief of Developmental and Behavioral Pediatrics at The University of Chicago Comer Children's Hospital and Professor of Pediatrics at Pritzker School of Medicine. He is also the Co-Director of the JP Kennedy Research Center on Intellectual and Developmental Disabilities. Dr. Msall specializes in the diagnosis and treatment of developmental, behavioral and learning problems in infants and children. He also is highly involved in the training of pediatric residents and fellows in developmental and behavioral pediatrics and the development of interdisciplinary care for underserved children at highest risk for neurodevelopmental disabilities. In his practice over the past 30 years, Dr. Msall has worked to optimize outcomes across the life course for children, adolescents and adults with prematurity, autism, cerebral palsy, Down syndrome, intellectual disability, and genetic disorders.

MOUNT SINAI UNIVERSITY ICAHN SCHOOL OF MEDICINE

Student

Naeemah Ruffin

Naeemah Ruffin is currently a third-year student in a dual degree Doctor of Podiatric Medicine/Master of Public Health program at the New York College of Podiatric Medicine and the Icahn School of Medicine at Mount Sinai. Prior to her current studies, Naeemah spent several years in corporate America excelling in the fields of accounting, risk management, finance and marketing and was one of the youngest executives to reach a senior-level position within the division of the company in which she worked. Her interest in medicine and public health began on a mission trip overseas to Zambia, Africa several years ago. During this trip, she realized the enormous need for public health and medical professionals amongst underserved populations. After returning to U.S. she was determined to devote her life to improving the lives of others. Her ultimate goal is to use her medical and public health training to help impoverished communities in urban areas in the U.S. and abroad.

Faculty Mentor

Cappy Collins, MD, MPH

Dr. Cappy Collins has a background in digital media design, followed by medical training at the Mount Sinai School of Medicine, pediatrics residency at the University of Rochester, and a fellowship in children's environmental health at Mount Sinai. His professional interests in child advocacy and community health led to the creation of Cyclopedia (cyclopedia.us), a bicycle program

that combines physical activity with collaborative online documentation to empower urban adolescents and reduce chronic stress; and Cada Paso (cadapaso.us), a family-based walking program to promote physical activity, social networking and health resource utilization. He is also co-founder of the New York State Pediatric Advocacy Coalition (NYSPEC) dedicated to promoting child health advocacy training, supporting successful child advocacy programs, and providing a statewide legislative voice. He is currently Assistant Director of the New York State Center of Excellence in Children's Environmental Health at Stony Brook. Dr. Collins is a proud alumnus of Break the Cycle 7 and 8.

SOUTHEAST PEDIATRIC ENVIRONMENTAL HEALTH SPECIALTY UNIT TEAM AT EMORY UNIVERSITY

Emory University Department of Pediatrics

PEHSU

Robert J. Geller, MD

Robert Geller currently serves as the Chief of the Emory Pediatrics Service at the Grady Health System/CHOA, Hughes Spalding campus, as Medical Director of the Georgia Poison Center, and as Director of the Emory Southeast Pediatric Environmental Health Specialty Unit (PEHSU). Dr. Geller was graduated in 1979 from Boston University School of Medicine. He then pursued his residency and Chief Residency in Pediatrics at the Medical College of Virginia in Richmond, followed by a fellowship in Clinical Pharmacology and Toxicology at the University of Virginia in Charlottesville. He is a fellow of the American Academy of Pediatrics, the American College of Medical Toxicology, and the American Academy of Clinical Toxicology. He has been a member of the Southeast PEHSU since its formation in 2001. He is the author of more than 50 publications, and is one of the editors of the text, *Safe and Healthy School Environments*. He is the author or co-author of numerous community information sheets and has met with community members at many sites of children's environmental health concern throughout the Southeastern United States.

Emory University Nell Hodgson Woodruff School of Nursing

PEHSU

Maeve Howett, PhD, APRN, CNP-Ped, IBCLC

Maeve Howett is a pediatric nurse practitioner, lactation consultant, and Clinical Associate Professor in the Nell Hodgson Woodruff School of Nursing at Emory University. She has over twenty-five years of pediatric nursing experience, with research interests in infant attachment and feeding, early childhood nutrition, toxic exposures in infants and lactating women and vulnerable pediatric populations. She is particularly interested in the at-risk mother-infant dyad made vulnerable by poverty or lack of resources. She lectures on multiple environmental topics and has incorporated environmental health into Emory School of Nursing's curriculum - twice lecturing to the National Student Nurses Association. Recently named to the Federal Advisory Committee: Environmental Protection Agency (EPA) Children's Health Protection Advisory Council (CHPAC), she also is President of the Georgia Chapter of Pediatric Nurse Practitioners and in 2013 became a Nurse Luminary with Healthcare Without Harm's Luminary Project. She serves on the international board of the Lactation Education Accreditation and Approval Committee (LEAARC) and in that capacity is also the commissioner to CAAHEP - the Commission on Accreditation in Allied Health Education Programs. Dr. Howett serves on the Sustainability Taskforce for Emory Healthcare. She has two grown children and is a foster parent for medically fragile infants.

Innovative Solutions for Disadvantage and Disability

PEHSU

Laura Wells, LCSW

Laura Wells serves as Project Administrator for the Southeast Pediatric Environmental Health Specialty Unit. She is Program Director for ISDD, Innovative Solutions for Disadvantage and Disability. Ms. Wells directs Project GRANDD, a program providing intensive supports to grandparents who are raising grandchildren with disabilities and works closely with Dr. Howett in providing community based clinical opportunities to Emory University graduate nurse practitioner students. She serves as the Project Coordinator for Healthy Tomorrows Partnership for Children's grant called Healthcare Without Walls: A Medical Home for

Homeless Children (HWW). As Project Administrator for the PEHSU, Ms. Wells serves as the initial contact to the SE PEHSU as well as the project coordinator to our Break the Cycle projects. Ms. Wells is a Licensed Clinical Social Worker with over 17 years of experience working with children and adults with developmental disabilities. She is also the parent of a child with special needs. With this diversity, she shares insight with parents and professionals alike. She is the contact person for the SE PEHSU.

Morehouse School of Medicine Department of Pediatrics Innovative Solutions for Disadvantage and Disability

PEHSU

I. Leslie Rubin, MD

Leslie Rubin, MD, is Research Associate Professor in the Department of Pediatrics at Morehouse School of Medicine, Co-Director of the Southeast Pediatric Environmental Health Specialty Unit at Emory, President and Founder of Innovative Solutions for Disadvantage and Disability, and Principal Investigator of the Healthy Tomorrows Partnership Project – Healthcare Without Walls, a project to create a medical home for homeless children. He founded the Institute for the Study of Disadvantage and Disability (now renamed Innovative Solutions for Disadvantage and Disability) in May 2004 and launched the first Break the Cycle Program in 2004-2005! He is dedicated to improving awareness and understanding of the relationship between social and economic disadvantage and disabilities in children. Since 2000, he has been a Co-Director with the Southeast Pediatric Environmental Health Specialty Unit at Emory University, where he focuses on raising awareness of environmental health disparities and promoting health equity for children - particularly those who are most vulnerable from exposure to adverse environmental factors. In 2012, the American Academy of Pediatrics (AAP) presented Dr. Rubin with the Calvin C. J. Sia Community Pediatrics Medical Home Leadership and Advocacy Award. This award honors pediatricians who have advanced the medical home through practice and advocacy, especially for children with special health care needs. On behalf of ISDD, he received the 21st Annual Community Service Award from Emory University Rollins School of Public Health and The Goizueta Business School of Emory University.

Emory University Department of Obstetrics & Gynecology

PEHSU

Kurt Martinuzzi, MD

Kurt Martinuzzi, MD, assistant professor, specialist in Obstetrics and Gynecology at Emory University is the newest member of the PEHSU region 4 team. His interests include resident and medical student education, recurrent pregnancy loss, premature ovarian failure and polycystic ovary syndrome. Over his 20 plus year career he has been awarded multiple teaching awards and presented at many national and regional Ob/Gyn meetings. Current NIH funded research involves the evaluation of a new rapid PCR technique to identify the shedding of HSV virus in laboring women.

George Washington University Children's National Medical Center in Washington D.C

Break the Cycle Consultant

Benjamin Gitterman, MD

Benjamin Gitterman, MD is Associate Clinical Professor of Pediatrics and Public Health at George Washington University and Children's National Medical Center in Washington D.C. His major interests have included Children's Environmental Health, Child Advocacy, and Community Health-focused training and program development. Prior to coming to Washington D.C., he was the Director of Ambulatory Pediatric Services for Denver Health and Hospitals, and was a faculty member of the University of Colorado School of Medicine. In Washington, he has been the Chair of General and Community Pediatrics at Children's National Medical Center. Dr. Gitterman was a co-founding Director of the Mid-Atlantic Center for Children's Health and the Environment (the PEHSU serving the mid-Atlantic region). He is a member of the Children's Environmental Health and Protection Advisory Council for

the State of Maryland. He has been a member of the Scientific Advisory Board for Children's Environmental Health of the U.S. Environmental Protection Agency, and has been a liaison member to the Advisory Committee for Children's Lead Poisoning and Prevention for the CDC. He has been a member of the American Academy of Pediatrics (AAP) Committee on Children's Environmental Health. He is currently the Chairperson of the AAP Council on Community Pediatrics and is a member of the AAP Task Force on Childhood Poverty. He continues to be a practicing pediatrician.

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Break the Cycle Consultant/Editor-in-Chief

Joav Merrick, MD, MMedSci, DMSc

Joav Merrick, MD, MMedSci, DMSc, is Professor of Pediatrics, Child Health and Human Development, Kentucky Children's Hospital, University of Kentucky, Lexington, United States and affiliated with the Division of Pediatrics, Hadassah Hebrew University Medical Center, Mt Scopus Campus, Jerusalem, Israel. He is the Medical Director of the Health Services Division for Intellectual and Developmental Disabilities, Ministry of Social Affairs and Social Services, Jerusalem, and the founder and director of the National Institute of Child Health and Human Development in Israel. He has authored numerous publications in the fields of pediatrics, child health and human development, rehabilitation, intellectual disability, disability, health, welfare, abuse, advocacy, quality of life and prevention. Dr Merrick received the Peter Sabroe Child Award for outstanding work on behalf of Danish Children in 1985 and the International LEGO-Prize ("The Children's Nobel Prize") for an extraordinary contribution towards improvement in child welfare and well-being in 1987.

Thank you to our sponsors and participants.

Southeast Pediatric Environmental Health Specialty Unit at Emory: www.pehsu.emory.edu

Innovative Solutions for Disadvantage and Disability: www.isdd-home.org

Sustainability Initiatives at Emory University: www.sustainability.emory.edu

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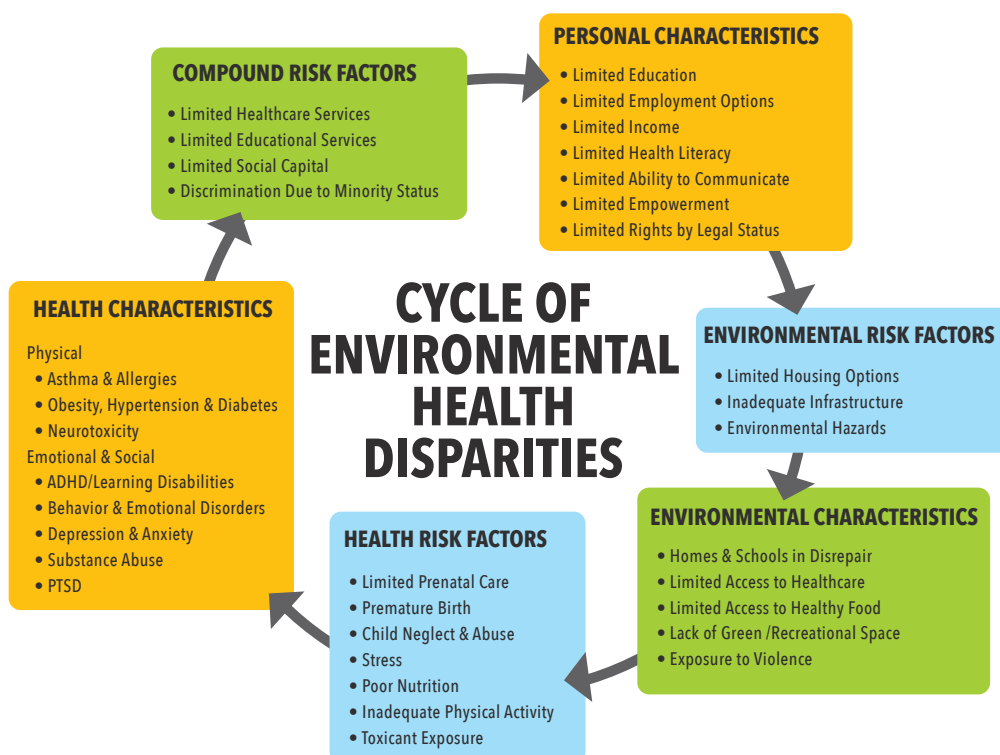
OVERVIEW OF BREAK THE CYCLE

The threats to children’s health and well-being are often multiple and complex. Children are uniquely vulnerable to environmental toxicants for several reasons: they are growing rapidly; they have a more active metabolic rate than adults; they breathe larger amounts of air for their size; they have a greater surface area-to-body mass; they are closer to the ground, and they may pick up and play with objects and then put these objects in their mouths and may even swallow them. They are at risk, therefore, to absorb more toxins in the environment through their skin, from the air they breathe, from the food they eat, and the water they drink. Also, they do not yet have the fully sophisticated metabolic systems to detoxify some chemicals, or they may metabolize chemicals into toxic metabolites at a different rate than adults. Furthermore, because they are growing rapidly and their organs and organ systems are developing, they may incorporate toxins into their developing organ systems which can have immediate adverse impact. They are more likely to suffer long-term consequences on organ structure and function that may only be evident much later in life.

Today, some of the major health concerns for children, such as asthma, obesity and its complications of hypertension and diabetes, and neurodevelopmental disorders (most commonly learning disabilities, attention deficit hyperactivity disorder and autism), are often caused or exacerbated by environmental factors. Not only does the presence of a disorder or disability create significant complications that affect the child’s health as well as learning and social opportunities, but it may adversely affect the child’s potential for self-actualization and fulfillment. This is a challenge, not only at an individual level, but also at the level of the family and community and, ultimately, it also has an impact on society in terms of prevention and management strategies, and utilization of resources as well as how society cultivates its future citizens, workforce, and leaders.

Not only are children vulnerable to the chemical, physical and microbiological factors in their environment, they are uniquely sensitive to the social and economic environment in which they live, learn, and play. It has become increasingly evident that children who grow up in an environment of social and economic disadvantage are at greater risk for exposure to toxins like lead and other chemicals. They are impacted by the age and quality of the houses in which they live as well as the schools where they learn, the infrastructure of the communities in which they live, the risks of violence that they may experience, and the associated emotional stress that they face on a day to day basis. The vulnerability of these children is therefore greater, by virtue of their risks for exposure, magnified further by limitations in support for optimal education, access to quality health care, infrastructure, and limited social capital. The impact is even greater because the risks are cumulative.

The diagram below illustrates the elements that operate when children are born into circumstances of social and economic disadvantage and the resultant impact that manifests in disparities in health and education. The diagram also illustrates how the pattern becomes intergenerational and traps people in this cycle.



Our real challenge is how to Break the Cycle and liberate the children by providing a more nurturing and supportive environment, greater access to quality education and health services and to opportunities for success in life. We know this can be achieved at many different levels.

At a fundamental level, the idea of changing the life of one child for the better can have a positive impact not only for that child, but also for the family, for other people who know that child and for what that child can do in the present and in the future to change the world for the better. So, it might be said that "if you save the life of one child, you may be saving the whole world!" Ideally, it would be desirable to improve the lives of as many children as possible today, so that we have a better world in the future. Realistically, however, doing so would require substantial changes, if not complete redesign to many of our social institutions, including the health care delivery system, educational system, social safety net systems and economic and financial systems. Because those changes are beyond our scope and require large shifts in politics and economics over long periods of time, we have developed an approach to Break the Cycle and change the world a little at a time towards achieving health and educational equity for our most vulnerable children.

Endocrine Modulation & Metal Exposure: Long Term Effects on the Children of Agricultural Working Mothers in Thailand.

Grant Walter, student, Dr. Dana Boyd-Barr, mentor, Rollins School of Public Health of Emory University, Department of Environmental Health

The study aims to characterize the effects of heavy metal exposure to agricultural working mothers in northern Thailand and changes in hormone levels in neonates and begin understanding the effects of environmental exposure to future pubertal development.

Hypothesis:

- Higher maternal exposure to individual heavy metals, lead, cadmium, arsenic and mercury, will decrease concentrations of luteinizing hormone in neonates
- Higher maternal exposure to the same individual heavy metals will result in lower anthropometric measurements, head circumference, body weight and body length, in neonates

Background: Changes in pubertal timing (precocious/delayed) increases risks for specific outcomes in both genders. Characterization of factors modulating timing of puberty has produced evidence suggesting a role of environmental exposure. Previous studies correlated delayed puberty and environmental toxicants, specifically heavy metals (HMs) but the mode of toxicity is unknown. Animal studies have shown possibilities with HM exposure and puberty modulation. Large focus has been framed around the Hypothalamic-pituitary-gonadal (HPG) axis. HMs have shown in multiple animal, and few human, studies to affect hormone production released from the axis, especially Luteinizing Hormone (LH).

Methodology: the Study of Asian Women And their offSpring's Development and Environmental Exposures (SAWASDEE) birth cohort was used. Metal concentrations were measured over pregnancy and compared to neonatal LH and anthropometrics. Measurement of metals was performed through ICP-MS and LH through EIA. Comparison was made through multivariate linear and logistic regression.

Results: Adjusted average maternal HM concentration for individual HMs and LH logistic regression yielded ORs of 0.59 (0.07, 4.69), 0.04 (<0.01, 1.03), 0.44(0.04, 5.30) and 2.55(0.48, 13.49) for Pb, Cd, As and Hg, respectively. Earliest individual maternal HM concentrations showed adjusted ORs of 1.37 (0.14, 13.35) for Pb, 0.54 (0.06, 4.90) for Cd, 0.94 (0.19, 4.68) for As and 0.99(0.32, 3.00) for Hg.

Discussion: Only Cd showed significant point estimates but lost this status after adjustment for other variables deemed important. This study is the first study looking at HM exposure and neonatal hormone release from the HPG axis. Findings suggest that HMs do modulate LH release in neonates at birth. Caution, however, should be used when interpreting results from this study. Use of the SAWASDEE birth cohort was originally intended to study organophosphate insecticide exposure and subsequent neurodevelopment. Information and samples were taken in regard to the aforementioned study and complicate the interpretive ability found from results here. Estimates and prevalence found have applicability in construction of future study sampling calculations and timing of sample collection for adequate study.

Racial and SES Disparities in Populations Surrounding Nuclear Power Plants

Student: Christina Sauer Mentor: Pamela J. Maxson PhD, Children's Environmental Health Initiative School of Natural Resources and Environment *University of Michigan, Ann Arbor*

This study examines the association between proximity to a nuclear power plant and the surrounding area's racial and socioeconomic characteristics (SES) on the East Coast of the United States.

Hypothesis:

Proximity to nuclear power plants, and the corresponding radiation, is associated with minority status and low income.

Background: Few academic studies examine the environmental justice issues surrounding nuclear power plants. Residents within a 30-mile radius of nuclear power plants are exposed to low levels of radiation. The current radiation protection standard, Reference Man, only protects Caucasian males between the ages of 20 and 30. The risk to the health of minority and low SES children has not been clearly defined if they live within 30 miles of a nuclear power plant.

Methodology: The 36 licensed operating nuclear power plants in the Northeast and Southeast United States were geocoded and layered with 2010 Census block groups and their corresponding racial and SES information. Block group population centroids that fell within a 30-mile radius of a nuclear power plant were identified. A logistic regression was used to investigate the association between population centroid proximity to a nuclear power plant and block group-level racial and SES characteristics.

Results: Block groups with a higher percentage of non-Hispanic black children were more likely to have their population centroid be within 30 miles of a nuclear power plant than block groups with a lower percentage of non-Hispanic black children when the given block group contained a low or medium percentage of Hispanic children and a high percentage of families living below the poverty line. Block groups with a high percentage of Hispanic children were more likely to have their population centroid fall within 30 miles of NPP than block groups with a low percentage of Hispanic children. This relationship was especially strong when the block group also contained a low percentage of non-Hispanic black children and a high percentage of families living below the poverty line.

Discussion: There is evidence of racial and SES disparities in populations surrounding nuclear power plants. There may be children exposed to levels of radiation that can result in life-threatening illnesses without national standards for safe exposure.

Impact of Housing on Body Size & Pubertal Timing.

Farah Dahdabhoy, student, Dr. Maida Galvez, mentor, Icahn School of Medicine at Mount Sinai, Departments of Preventive Medicine and Pediatrics

This study explores the associations between housing quality and timing of puberty in urban black and Hispanic girls.

Background

Age of onset of puberty continues to decline in the U.S. Earlier pubertal development has been linked to several adverse outcomes across the life span, including reproductive cancers, depression and cardiovascular disease. While widespread obesity may be a major cause, there is mounting evidence that a girl's psychosocial and built environment may also play a role. Housing is one avenue where these various exposures intersect. Scarce research, however, has examined the impact of housing quality on pubertal timing.

Methods

385 New York City girls' ages 6 to 8 years enrolled in an ongoing longitudinal study, Growing Up Healthy, were included in our analyses. Surveys administered to caregivers discerned whether the girls resided in public or private housing. Breast budding, pubic hair development and BMI were assessed annually by pediatric providers and trained field staff. The data was serially segregated and classified by ethnicity and housing to examine associations between housing, race, BMI and age of puberty.

Results

Median age of breast budding remained constant among black and Hispanic girls regardless of housing type. In fact, forty percent of the cohort was overweight irrespective of housing. Preliminary unadjusted analyses suggest that pubic hair development occurred earlier in Hispanic girls living in public housing. Hispanic girls living in privately owned housing exhibited pubic hair growth at a median age of 10.8 years while Hispanic girls residing in public housing had pubic hair development at a median age of 8.9 years. Thus, progression of puberty, as indicated by pubic hair development, occurred 23 months earlier in Hispanic girls living in public housing.

Conclusions

Housing quality may be associated with earlier age of pubic hair growth in Hispanic girls. Given concerns about a potential decline in age at puberty and associated health risks, further research is needed to examine the impact of housing on onset of puberty and long-term health outcomes.

An assessment of the Relationship Between Environmental Risk Factors and Malnutrition in Children Born from Teenage Mothers in Chipata Compound of Lusaka District.

Chalwe Chanda, student, Nosiku Sipilanyambe Muniyinda, mentor, University of Zambia School of Medicine, Department of Public Health

The study assess the relationship between various environmental risk factors and nutrition in under five children born from teenage mothers in the low income settlement of Chipata Compound in the heart of Lusaka City, the capital of Zambia.

Research questions:

- What environmental risks are under-fives exposed to in Chipata compound?
- Is there an association between the environmental factors and nutrition status of the child?
- Are children born from teenage mothers at a higher risk of having malnutrition than those born from older women?

Background More than three million children under five die each year from environment-related causes and conditions. This makes the environment one of the most critical contributors to the global toll of more than ten million child deaths annually -- as well as a very important factor in the health and well-being of their mothers.

Methodology The study was a cross-sectional survey that used systematic random sampling to recruit children and their mothers. It investigated nutrition status by checking for the Mid-upper Arm Circumference (MUAC) and Weight-for-Age. To test associations and their strength, cross tabulations and Chi Square were used.

Results. Housing status showed a highly significant association with nutrition status of the child ($p=0.01$). However, sanitation facility, source of drinking water, and availability of waste collection services showed a relatively weaker relationship with nutrition in children, although literature indicates a very strong association. This was partly attributable to the low mother and child recruitment into the study. Children born from teenage mothers were not at a higher risk of being malnourished than those born from older mothers.

Discussion The study revealed that under five children in Chipata compound of Lusaka City lived in a low income community, with low cost housing, and were exposed to highly unsanitary conditions. With the unimproved pit latrine as the common sanitary facility, contamination of groundwater is highly plausible. Further, the low income housing, coupled with the unplanned nature of the settlement, largely contributes to the high contamination of drinking water sources, resulting in diarrhoeal infections, and eventual malnourishment in the under-five child.

Environmental Factors That Triggers Asthma in African-American Children in Low-Income Communities in Fort Valley, GA.

Jasmine Williams, student, Dr. Saul Mofya, mentor, Fort Valley State University, Dept.of Veterinary Science and Public Health

This study focuses on the relationship between urban quality, indoor allergens, and health disparities as they relate to Asthma within African-American families living in low-base income housing in Fort Valley, GA.

Hypothesis: African American children who live in low income communities in Fort Valley, Georgia and are under the age of 14 will most likely be exposed to environmental factors that trigger asthma.

Background: Asthma is a leading chronic disease affecting children. 6.8million children are affected with asthma in the United States. This disease occurs in 3 out of 5 children and steadily increasing. African-Americans have more severe symptoms of asthma than any other racial and ethnic groups. Reasons for more severe symptoms of asthma are due to environmental factors, poverty, lack of education, and obesity.

Methodology: We searched three online databases which include the following: Georgia Department of Public Health North Central Health District Peach County 2013 Health Status Report, The city-data of Fort Valley, Georgia, and NBC news lists worst, best cities for air quality.

Results: In our review it has been determined that the prevalence of asthma among African-American children in Peach County suffer from asthma is between fifteen and twenty percent. Poverty, environmental factors, lack of education, and obesity contribute to asthma in African-American children in low-income communities. The environmental factors that trigger asthma include: poor housing, cockroaches, dust mites, high relative humidity and temperature. A lack of education can lead to non-compliance of follow-up recommendations and to seek further specialized treatment. Poverty plays an important role in children with asthma. Furthermore; many of the families that are impoverished do not have proper health care, insurance, and poor nutrition, which will lead to obesity.

Discussion: Poverty, environmental factors, lack of education, and obesity are major factors that play important roles in triggering asthma in African-American children in low-income housing.

Conclusion: There is an apparent disconnect between the communities concern and the consequences dealing with environmental factors that could instantly cause severe symptoms in asthma. Furthermore, there is a need for African-American community leaders, medical, environmental, and public health professionals to form a partnership in creating a forum to promote public awareness, in communities and schools about asthma.

Home Environment, Low-Income Children and Primary Care Medical Homes

Xin Hu, student, Laurie Gaydos, PhD, mentor, Rollins School of Public Health at Emory University

This study examines whether home environment predicts the likelihood of receiving high quality healthcare for low-income children, as measured by the PCMH criteria.

Hypothesis:

- (1) A healthier home environment is associated with higher quality of healthcare
- (2) In states that have more advanced PCMH implementation, the association between home environment and healthcare quality remain significant and become more dramatic

Background:

The Patient-Centered Medical Home (PCMH) is an innovative primary care delivery system that sets high standards for quality of healthcare practices. Despite the nation-wide movement to implement PCMH, we are still seeing large variation in the quality of health service provision for children. Many studies have showed that demographic characteristics and availability of providers significantly influence the healthcare quality received. However, few studies have focused on the home environment, which may act as a proxy for child-rearing behaviors that may be important in predicting the medical care children receive.

Method:

We used the 2011-2012 National Survey of Children's Health ($n = 20,801$) to examine the association between home environment and quality healthcare and how it changes in settings with sufficient supply of PCMH providers. We used ordered logistic regression for both analyses.

Results:

Children living in the healthiest home environments were 20% more likely to receive high quality of healthcare ($p=0.014$) compared to those in poor home environments, and in states with higher PCMH presence, children in healthy homes had 68% better chance to enter higher quality level than the those in poor quality homes ($p=0.008$).

Discussion:

Caregivers who create a healthier home environment are more likely to choose higher quality of healthcare providers, especially when there are sufficient healthcare resources in the region. Previous studies that demonstrated a significant positive impact of PCMH on healthcare outcomes may be subject to selection bias and may, therefore, overestimate the influence of PCMH practices to improve care. Future studies should control for home environment in order to accurately identify the net effects of PCMH.

The Determinants of Access to Healthcare Services in Georgia

Shruthi Satyamurthy, Student, Dr. Daniel Montanera, Mentor, J. Mack Robinson College of Business, Georgia State University, Department of Healthcare Administration

This study attempts to estimate the effects of racial concentration on access to healthcare.

Hypothesis:

Racial concentrations of neighborhoods, particularly that of minorities, is a significant factor in determining an individual's access to care, even controlling for income, education, employment, and other individual characteristics.

Background:

In the past, blacks had no freedom to choose their own housing in their preferred area and were exempted from shifting their house to suburbs through establishment of racial barriers. This racial segregation contributed to higher risk of chronic diseases, increased infant mortality rate, low birth weight and failure of quality care. These poor health outcomes can lead to poor income, education and lifetime achievement. The Affordable Care Act has lowered financial barriers to care through subsidies and market reforms, but other barriers reinforcing these disparities remain in place.

Methodology:

This study links individual-level data (race, income, employment status, etc.) from an independently conducted survey with neighborhood-level characteristics (racial concentration, average income, distance to health care facilities) from City data and Zip Atlas and Dartmouth Atlas of Health Care through the individual's zip code. Using OLS regression, it estimates the effects of these variables on the individual's number of visits to a health care facility in the past year, as well as the individual's level of satisfaction with their access to health care.

Results:

Controlling for race, income, education, and employment status, the percentage of black residents in an individual's neighborhood is significantly negatively correlated with both the individual's number of visits to a health care facility and that individual's current satisfaction with their access to health care. This suggests the presence of access barriers to health care in predominantly black neighborhoods.

Discussion:

Rather than focusing expansion at the individual-level by targeting low-income or unemployed individuals, not-for-profit health care organizations and policymakers should pursue neighborhood- or community-level projects. This will most effectively overcome health care access disparities and break the cycle of poor health outcomes and lifetime achievement issues with which these young girls grapple, and deepen our understanding of their development.

Mitigating Effects of Positive Learning Environment on Early Life Exposure to ETS on Neurodevelopment in Children

Madeleine Hopson, student; Julie Herbstman, PhD, mentor, Columbia University Mailman School of Public Health
Department of Environmental Health Sciences

This study examines the role of the home environment as an effect modifier of prenatal environmental tobacco smoke exposure (ETS) on children's neurodevelopment.

Hypothesis:

Children who are exposed to high levels of prenatal ETS exposure that also experienced an enriched learning environment during early childhood, will demonstrate better neurocognitive and behavioral development than those not growing up in an enriched environment.

Background:

Increasing evidence links prenatal exposure to environmental tobacco smoke (ETS) with a measurable increased risk of cognitive disturbances and ADHD-like symptoms by age 2. Because smoking rates are higher in low-income populations, prenatal exposure to ETS is also higher among these populations. However, evidence in animal models has demonstrated that exposure to an enriched learning environment can counteract the detrimental cognitive and behavioral effects caused by developmental neurotoxicants (e.g., lead). Few studies have examined this association in a human population.

Methodology:

We examined whether the effect of prenatal ETS exposure on cognition and behavioral symptoms at age 7 years is modified by the quality of the home environment. We examined this relationship in a cohort of children enrolled in the Columbia Center for Children's Environmental Health longitudinal birth cohort. This cohort includes children and families from the Washington Heights, Inwood, South Bronx, and Harlem neighborhoods of New York City, all typically low-income areas with high immigrant populations. These areas have been shown to have some of the highest quantities of negative environmental exposures and subsequent health problems in New York City.

In this cohort, pre- and postnatal ETS has been measured by questionnaire and also by the measurement of cotinine in cord blood. Child cognition at age 7 was measured using the Wechsler Intelligence Scale for Children (WISC) and behavioral symptoms by the Child Behavior Checklist (CBCL). The quality of the home environment was characterized using the Early Childhood HOME Inventory (HOME), a validated, interviewer-conducted assessment that summarizes the entire environment of the child, including dimensions of learning materials, physical environment, and language stimulation at age 3. We used linear regression, negative binomial regression, and logistic regression accordingly to assess whether the HOME score is an effect modifier of the association between early life ETS and different neurodevelopmental indices.

Results:

ETS had no significant effect on children's cognitive functioning at age 7 in crude or HOME interaction-adjusted models. ETS was associated with a higher number of symptoms in externalizing domains. A positive HOME environment significantly mitigated the negative effects of prenatal ETS exposure on rule breaking and externalizing behaviors. Additionally, homes with high scores in language stimulation also mitigated the association between ETS and attention problems and rule breaking behaviors. We also found that children who grew up in a home environment that was ranked in the lowest 25th percentile had significantly exacerbated behavioral scores in the dimensions of attention problems, rule breaking, aggressive behaviors, and externalizing behaviors. More specifically, homes with low scores in learning material availability and language stimulation exacerbated the ETS-related effects on behavioral outcomes.

Discussion:

Some negative developmental behavioral effects that are associated with ETS exposures early in life may be modified by the provision of an enriched learning environment. Children who grow up in high poverty areas inherently face negative environmental exposures and less enriched learning environments as a function of their disadvantaged environments. This study suggests enriched home environments could provide an avenue to break this cycle.

Implementing Community Supports to Lessen Health Disparities at Kindergarten Entry for Preterm Survivors

Amelia Dmowska, student; Michael E. Msall, MD, mentor, University of Chicago Medicine Comer Children's Hospital
JP Kennedy Research Center on Intellectual and Developmental Disabilities
Section of Developmental and Behavioral Pediatrics and Illinois LEND

Background

A growing body of research suggests that the earliest years of life are a particularly promising time to intervene to reduce health and educational disparities in the lives of low-income children. Preterm birth is disproportionately high in children experiencing social disadvantage and minority status. Early intervention services aim to reduce educational costs by minimizing the future need for special education services. Limited data exists to examine the impact of early intervention and preschool services for children who are very preterm on special education costs.

Objective

Our goal was to evaluate the impact of accessing quality community interventions in the preschool years and how these services decrease long term special-education costs.

Methods

The cohort of study included 121 very preterm infants who received surfactant ventilation and were enrolled in a randomized controlled study of nitric oxide for respiratory distress syndrome. These children were followed up at the ages of 2 years and 5 years 6 months. 10% of children who were Hollingshead 4 or 5 accessed early intervention. 25% of current cohort accessed Head Start or Early Child Education (ECE). The missed opportunities and educational costs from not implementing the IHDP model was calculated using current Illinois Department of Education community reports.

Results

For every 100 very low-birth weight infants without Early Intervention (EI) or Early Head Start (EHS), the lifetime cost of special education is \$14.9 million. For every 100 very low-birth weight infants that do receive Early Intervention or Early Head Start, the number needing special education decreases to \$7.0 million. In order to increase EI-EHS-ECE from 35% to 90% will cost \$40K per child. In a cohort of 100 children with prematurity and special disadvantage, this will save special education \$7.9 million in lifetime educational costs. For every dollar invested in prevention there is a savings of \$3.60.

Conclusion

Children of very low birth weight status benefit from access to early intervention, Early Head Start, and preschool early child education. These services dramatically reduce long-term educational costs. If we include the costs of dropping out the return on investment is \$7.20 benefit to \$1 costs.

Closing Health Disparities Through a Multi-Level Approach

Naeemah Ruffin, student; Cappy Collins, mentor, Icahn School of Medicine at Mount Sinai

Hypothesis:

A community-based intervention (namely, Concrete Safaris) that works on three levels (public policy, the neighborhood, and the individual) to enable children to exercise and eat a healthy diet will improve their academic performance and fitness.

Background:

Significant health disparities exist in the East Harlem community, versus other communities in New York City, and the children in this community are disproportionately affected. The environment in which these children live in East Harlem is 88% Black/Hispanic, 38% of the residents live in poverty, 67% are obese, and the health profiles of the children follow a similar pattern. Furthermore, there is minimal access to healthy foods in East Harlem as compared to other areas in New York City. These conditions make it difficult for children to make healthy choices to positively impact their lives.

Methodology:

Cohort study in two phases:

Phase 1 assesses academic performance, school attendance and improvement in fitness of all students enrolled and returning students in the Concrete Safaris program from the school years 2012-2013 and 2013-2014.

Phase 2: assesses academic performance, school attendance and improvement in fitness of the students in the Concrete Safaris program that are high-attenders comparing them to students in the program that are low-attenders and comparing the overall students in the Concrete Safaris program to a control group of students selected from the school district.

Results:

Preliminary Phase 1 results demonstrate that consistent enrollment in the Concrete Safaris program by students that returned from the previous year both improved their fitness and raised their academic performance. The statistical significance of these results is currently being assessed.

Discussion:

A child's environment in which they live, both in the home and outside the home, can significantly hamper their ability to make decisions that will positively impact their life. A multi-level, grass-roots, community-based intervention can help change a child's environment to enable them to be healthy and live their life to the fullest; though the strength of these results is not yet established.

STUDENT COMMENTS ON THE BREAK THE CYCLE EXPERIENCE

This has been a wonderful experience for us since we have had the opportunity to work side by side with outstanding professionals at Emory University. We have already learned so much from our last years' experience with BTC, such as the holistic approach you have in your practice when assessing children. During this new project we have learned even more from receiving enlightening opinions of the different participants of BTC to improve our research. We will also have been able to extract great ideas to incorporate in our work in Chile. We know for sure that we will be helping to Break The Cycle in our community. Keeping this in mind it is important, since the final aim of all the work we do goes in favor of helping our patients, specially the underprivileged children and their families.

Dra. M. Ignacia Eugenin

Residente Pediatría Universidad Católica de Chile

BTC allowed me to dig deeper into a topic I'd been working on – and what I found was really quite interesting! My original hypothesis turned out to be incorrect and thinking about the possible reasons for that – as well as the implications of those underlying reasons – has been both challenging and worthwhile. I've also really enjoyed listening to the other projects. The differences between the projects have made clear how far-reaching environmental health disparities can be and the kind of impacts they can have on the population. I'm really looking forward to meeting everyone in person and hearing the presentations.

Amanda Brzozowski

Emory University Rollins School of Public Health

I feel honored to have our project received so enthusiastically and am very excited to share my passion and work with an international group. Our pilot study will provide a model for a physical activity intervention for overweight/obese urban minority youth that can be replicated at schools and facilities across the country.

Incorporating key components of safe exercise prescriptions for obese adolescents from physical therapy into a triathlon program provides a novel and safe medium that allows for individual and team training and goal setting while it redefines success, not as winning with points, but as advancing towards one's full potential to successfully compete and enjoys physical activity events.

Jeff Condit, CSCS

Marquette University: Exercise Physiology '13

BTC fellowship was crucial in allowing me to have the support to explore research topic that excited me most, which turned the luxury of intellectual freedom to a reality of daily life.

Shanna Gairy-Miller

Fort Valley State University

Participating in Break the Cycle has provided me the opportunity to explore real solutions to improving environmental conditions in my community. For years, I have heard people complain about problems with Tuskegee's educational system, but with no solution. By participating in BTC I have been able to take a deeper look at the characteristics that perpetuate the cycle in Tuskegee. I have also been able to examine how the mentoring/tutoring program that I started years ago, Next Step Up, has worked towards breaking the cycle to make a substantial positive impact in my hometown. This has been an incredible experience, and with this foundation I hope to continue working towards improving the educational and community environment in Tuskegee.

Elise Tolbert

Michigan

University of

Participating in this program has allowed me to explore an area that I have always had great interest in but had none done academic research in. I have been able to better understand the influences that impact African American girls and how it relates to larger disparities in areas such as mental health and physical wellbeing. Furthermore, the collective nature of the program has illustrated how interconnected many of our interests are and the importance of finding valuable and feasible solutions. Overall, I am so happy to have participated in the program.

Johari Harris

Georgia State University

SUMMARY OF ACADEMIC PARTNERSHIPS (2005 - 2015)

University Partners and the Departments:

- Columbia University, Mailman School of Public Health
- Clark Atlanta University, School of Social Work
- Duke University – Children’s Environmental Health Initiative
- Duke University – Trinity College
- East Tennessee State University, Quillen College of Medicine, Department of Pediatrics
- Emory University Barton Law Center
- Emory University Nell Hodgson Woodruff School of Nursing
- Emory University Rollins School of Public Health
- Fort Valley State University, Department of Graduate Studies
- Fort Valley State University, Department of Veterinary Science & Public Health
- George Washington University School of Medicine & Health Sciences
- Georgia Institute of Technology, Department of Architecture
- Georgia State University Department of Educational Psychology and Special Education
- Georgia State University, Department of Public Health, Healthcare Management and Policy
- Georgia State University School of Law
- Georgia State University, J. Mack Robinson College of Business
- Harvard School of Public Health
- Hofstra University, Department of Health Professions
- Marquette University, Department of Physical Therapy
- Mercer University School of Medicine, Department of Community Medicine
- Morehouse School of Medicine, Department of Community Health and Preventive Medicine
- Morehouse School of Medicine, Masters in Public Health
- Mt. Sinai School of Medicine, Preventive Medicine
- Pontificia Universidad Católica de Chile, Department of Pediatrics
- Spelman College, Department of Biology
- Tulane University Law School
- Tulane University, School of Public Health and Tropical Medicine
- University of Chicago, Pritzker School of Medicine
- University of Florida in Jacksonville, College of Medicine and College of Public Health
- University of Kentucky, Department of Pediatrics
- University of Michigan – Ann Arbor, School of Natural Resources and Environment
- University of Munich
- University of North Carolina-Chapel Hill, Gillings School of Global Public Health
- University of Zambia, Department of Public Health
- Wayne State University, School of Medicine

Totals to Date: University Departments: 35 Students Mentored: 97

SUMMARY

We have developed an approach to Break the Cycle that is modest, manageable, incremental and achievable. We focus on university students who are in a learning phase and are excited about making a difference in the world. We realize that we, in our generation, may not be able to achieve our ultimate goal but, if we can establish the system and set the process in motion, our goals will be achievable in the future. In other words, we are cultivating our future leaders to improve the lives and the potential of our most vulnerable children and, in so doing, change the world for the better.

The model is simple; we invite students from a variety of different disciplines in universities around the country and the world to develop projects to Break the Cycle that they can achieve in one semester. They are required to have a mentor from their academic discipline who will coach them and guide them through the research process. Some projects are descriptive and some interventional, but all of them contribute significantly to our knowledge of what the challenges are and how we may act to make a positive difference.

The Break the Cycle Program thus is a collaborative, interdisciplinary set of creative projects developed by university students from different schools in different states that specifically address the challenge to Break the Cycle of Environmental Health Disparities. Each year, students from a variety of universities and academic disciplines are invited to submit proposals that will Break the Cycle. The application process with selection criteria judging the likelihood that the students selected will ultimately complete a project that conceptually will break the cycle in a meaningful way. This competitive process enables the selection of those projects with the most promise to become the cadre of students for that particular year. The students will then work collaborative and collectively with their academic mentors and Break the Cycle faculty, towards completion of the projects.

The process is time-limited and time sensitive. From the moment that the students have been selected, we hold conference calls with all students and mentors to have each describe the projects, the research methodology, and describe how their projects will contribute to break the cycle. These conference calls occur monthly in order to keep track of the students and keep them on track. The students and their mentors also have the opportunity during these conference calls to become familiar with the work of the other students from the other universities and disciplines and expand their understanding and appreciation for the complexity of the challenges and solutions. Completion of the project coincides with a conference in which the students are required to present their work to their Break the Cycle peers and to a broader academic and community audience. For many, this may be their first formal public presentation. Once the project and presentation are completed, they are required to write up their work, which then is published collectively in a supplement to an international journal. Thus, the project, the presentation, and the paper become valuable experiences and achievements for the students that will guide, shape, and support their future success.

Since its inception in 2004-2005, we have had over 90 students from 35 different departments of 26 different universities from nine states in the continental USA. This year, we continue our work with international students, from the University of Zambia. In 2012, we conducted a survey of all the students who had been part of the program from 2004-2011 and learned that an overwhelming number –indeed, almost all – felt the project was worthwhile. Most reported that it increased their knowledge and understanding of children's environmental health disparities and that they valued the exercise and the outcomes of their involvement in the program. Many graduates reported that they are currently involved in a similar field of practice in academic settings, in the community or in the private sector. The details of this report will be published in the near future.

The important message is that the Break the Cycle Program can make a difference in generating projects that raise awareness of children's environmental health disparities. It inspires and cultivates a group of students for whom this program is a step towards a career and towards leadership in reducing health disparities and promoting health equity for all children, regardless of their social and economic circumstances.

This year, we have another set of stimulating projects from 11 university departments, from 10 universities in 5 states and one international university. The projects are grouped into 3 categories: Environment and Health, Economics and Healthcare and Making a Difference.

On the day after our conference we deal more in depth with the issue of the cost benefit of breaking the cycle of health disparities. Participants will have the opportunity to examine possible solutions and their cost benefit through work groups.

CONCLUSION

Children living in circumstances of social and economic disadvantage are at higher risk for experiencing health problems caused or exacerbated by environmental factors. They are more likely to be trapped in the cycle of environmental health disparities as a result of family stress, limited quality education, limited social capital, and lack of access to comprehensive healthcare and appropriate educational services. Furthermore, the homes and neighborhoods in which they live learn and play are inadequate at best, and may even result in a serious impact on the child's health, growth and development.

Given the current economic realities, it seems unlikely that many children and families will escape this cycle unless resources and public policies make children's health and the environment a priority.

The Break the Cycle project is a replicable means by which to promote student interest in addressing issues related to environmental health disparities. It serves as a catalyst through which academic mentors committed to issues of children's health and environmental justice can inform, guide, and inspire future professionals to become actively involved in finding creative solutions to environmental health dilemmas that the children of tomorrow will face.

This suggests that the incorporation of children's environmental health environmental health disparities into college curricula is likely to play an important role in shaping future leaders who will be invested in breaking the cycle of environmental health disparities.

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BTC III

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BTC IV

Rubin IL, Ace K, Nodvin J, Geller RJ, Marcus M, Merrick J. Vulnerable children: Break the cycle of environmental health disparities. *International Journal of Child Health and Human Development* 2010;3(4):357-453.

BTC V

Rubin IL, Nodvin J, Geller RJ, Marcus M, Merrick J. Vulnerable children: Break the cycle of environmental health disparities. *Reviews in Environmental Health* 2011;26(3):135-229.

BTC VI

Rubin IL, Geller RJ, Nodvin J, Marcus M, Howell M, Merrick J. Break the cycle of environmental health disparities in vulnerable children. *International Journal of Disabilities and Human Development* 2012;11(4):295-409.

BTC VII

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BTC VIII

Rubin IL, Geller RJ, Nodvin J, Howett M, Gitterman BA, Merrick J, eds. Break the cycle of disadvantage and disability: Environmental factors, education, AIDS and food insecurity. *International Journal of Child Health and Human Development* 2014;7(3):207-335.

BTC IX

Rubin IL, Geller RJ, Nodvin J, Howett M, Gitterman BA, Merrick J, eds. Break the cycle of disadvantage and disability: The law, health, the environment and international perspectives ---- A birthday tribute to the pediatrician I Leslie Rubin. *International Journal of Child and Adolescent Health* 2015;8(4):xx-xx.

Pediatric Environmental Health Specialty Units

www.pehsu.net

The Pediatric Environmental Health Specialty Units (PEHSU) form a respected network of experts in children's environmental health. The PEHSU were created to ensure that children and communities have access to, usually at no cost, special medical knowledge and resources for children faced with a health risk due to a natural or human-made environmental hazard. Located throughout the U.S., Canada, and Mexico, PEHSU professionals provide quality medical consultation for health professionals, parents, caregivers, and patients. The PEHSU are also dedicated to increasing environmental medicine knowledge among healthcare professionals around children's environmental health by providing consultation and training. Finally, the PEHSU provide information and resources to school and community groups to help increase the public's understanding of children's environmental health.

REGION 1

Service area: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

New England Pediatric Environmental Health Specialty Unit

Academic Affiliation: Harvard Medical School and Harvard School of Public Health

Hospital Affiliation: Children's Hospital Boston and Cambridge Hospital

Location: Boston, Massachusetts

REGION 2

Service area: New Jersey, New York, Puerto Rico, Virgin Islands

Mount Sinai Pediatric Environmental Health Specialty Unit

Academic Affiliation Mount Sinai School of Medicine: Department of Pediatrics. Department of Community and Preventive Medicine

Hospital Affiliation: Mount Sinai Medical Center

Location: New York, New York

REGION 3

Service area: Delaware, Maryland, Pennsylvania, Virginia, Washington DC, West Virginia

Mid-Atlantic Center for Children's Health & the Environment Pediatric Environmental Health Specialty Unit

Academic Affiliation: George Washington University

Hospital Affiliation: Children's National Medical Center

Location: Washington, DC

REGION 4

Service area: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

Southeast Pediatric Environmental Health Specialty Unit

Academic Affiliation: Emory University Department of Pediatrics

Hospital Affiliation: Children's Healthcare of Atlanta –

Egleston Children's Hospital and Hughes Spalding Children's Hospital

Location: Atlanta, GA

REGION 5

Service area: Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

Great Lakes Centers' Pediatric Environmental Health Specialty Unit

Academic Affiliation: University of Illinois at Chicago, School of Public Health

Hospital Affiliation: Stroger Hospital of Cook County

Location: Chicago, Illinois

REGION 6

Service area: Arkansas, Louisiana, New Mexico, Oklahoma, Texas

Southwest Center for Pediatric Environmental Health

Academic Affiliation: Texas Institute of Occupational Safety and Health - University of Texas Health Science Center at Tyler, West Texas Regional Poison Center in El Paso, and the Occupational & Environmental Health Program at the University of New Mexico

Hospital Affiliation: University of Texas Health Science Center at Tyler

Location: Tyler, Texas

REGION 7

Service area: Iowa, Kansas, Missouri, Nebraska

Mid-America Pediatric Environmental Health Specialty Unit

Academic Affiliation: University of Missouri-Kansas City School of Medicine

Hospital Affiliation: Children's Mercy Hospitals and Clinics

Location: Kansas City, Missouri

REGION 8

Service area: Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

Rocky Mountain Pediatric Environmental Health Specialty Unit

Academic Affiliation: University of Colorado Health Sciences Center

Hospital Affiliation: National Jewish Medical and Research Center in collaboration with Denver Health and Hospitals Authority and the Rocky Mountain Poison and Drug Center

Location: Denver, Colorado

REGION 9

Service area: Arizona, California, Hawaii, Nevada

University California Pediatric Environmental Health Specialty Unit

Academic Affiliation: University California at San Francisco and University of California at Irvine

Hospital Affiliation: University of California, Irvine Medical Center

Location: San Francisco and Irvine, California

REGION 10

Service area: Alaska, Idaho, Oregon, Washington

Northwest Pediatric Environmental Health Specialty Unit

Academic Affiliation: University of Washington: Occupational and Environmental Medicine Program, Department of Pediatrics

Hospital Affiliation: Harborview Medical Center, University of Washington Medical Center, Children's Hospital and Regional Medical Center

Location: Seattle, Washington

Service area: Canada

Canada Pediatric Environmental Health Specialty Unit

Academic Affiliation: University of Alberta and Stollery Children's Hospital

Hospital Affiliation: Misericordia Community

Service area: Mexico

Mexico Pediatric Environmental Health Specialty Unit (Unidad Pediatrica Ambiental)

Academic Affiliation: National Institute of Public Health (Instituto Nacional de Salud Publica)

Hospital Affiliation: Morelos Children's Hospital (Hospital del Nino Morelense)

Location: Cuernavaca, Mexico