

## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **Negative Childhood Experiences and Adult Intimate Partner Violence, Sexual Abuse, and Stalking Among College Students: Does a Relationship Exist?**

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**Abstract:** Research has shown adverse childhood experiences (ACEs) correlate with many negative adult health outcomes, including an increased likelihood of experiencing intimate partner violence (IPV). Further, it has been found that as ACEs increase, rates of IPV increase by as much as 3.5 times in women and 3.8 times in men. We investigated this relationship between ACEs and college student's history of IPV, sexual abuse, and stalking, through a random sample of 2,900 undergraduates at two public universities. The web-based survey was administered during March 2015 and included questions from the ACEs, which ask about negative experiences including psychological, physical, or sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned, which occurred prior to the student turning 18. These questions were analyzed along with self-reported rates of abuse, specifically unwanted sexual activity, stalking, and IPV, occurring within the current academic year. Chi-square tests of independence and logistic regression models were used to evaluate the relationship between ACEs and adult IPV, sexual abuse, and stalking. We found that students with an ACE Score of 4 or higher are between 2-4.8 times more likely to experience violence while in college, and a dose response relationship was present between ACE score and levels of violence. These findings have implications for interventions focusing on reducing rates of violence among college students by targeting primary prevention strategies, and suggest a need for incorporating discussion of ACEs into these strategies.

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## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **Trends of Opioid Prescribing in Kentucky, 2012-2016**

Author(s): H. Luu, Kentucky Injury Prevention and Research Center, U of Kentucky  
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**Abstract:** Introduction: Increased opioid prescribing has been associated with increased risk of drug misuse, diversion, and overdose. Counties in Kentucky Appalachia have been historically among the counties with the highest opioid prescribing rates in the U.S. The Kentucky House Bill 1 from 2012, and licensure boards' regulation in 2013 addressed harmful prescribing practices. The goal of this study was to describe the changes in opioid prescribing in Kentucky from 2012 to 2016, and the discrepancies between Appalachian and Non-Appalachian region trends. Methods: Daily cumulative dose (DCD) of morphine milligram equivalents (MMEs) were calculated at prescription and patient levels using the Kentucky All Schedule Prescription Electronic Reporting System (KASPER) data. High opioid prescribing (HOP) at the patient level was defined as at least 3 days with  $\geq 100$  MME. Results: There was a 53% reduction in the number of patients with more than three days of high daily MME from 2012 to 2016. The HOP annual rate decreased both among the Appalachian county residents (from 29/1,000 in 2012 to 14/1,000 in 2016) and Non-Appalachian county residents (from 22/1,000 in 2012 to 13/1,000 in 2016). The counties with the HOP rates in 2016 were Powell (28/1,000), Crittenden (26/1,000), and Livingston (25/1,000). Repeated measures regression was utilized to model the number of patients with HOP by county over time and the relation to socio-economic and health status measures, 2012-2016. Conclusions: The results from this study will be used by the Kentucky Drug Overdose Prevention Program to inform targeted prescriber education and prescription drug overdose prevention.

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## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **Should the Kentucky legislature adopt a sales tax on sugar sweetened beverages to encourage better nutrition and reduce obesity?**

Author(s): A. Aroh, Department of Health Management and Policy, U of Kentucky  
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**Abstract:** Kentucky adult obesity rate is on the rise; 34.6%, from 21.7% in 2000 and 12.7 % in 1990. The increase in the rate of Type 2 Diabetes (T2D) has been attributed to the high rate of obesity. As at 2011, hospitalization charges to diabetic patients in the state of Kentucky grew to \$183.8million from \$169.5million in 2010. Sugar-sweetened beverages (SSBs) are the largest source of added sugar in the US diet and have been linked to an increase in the risk of obesity and diabetes. The CDC estimates that 43.2% of adult population in Kentucky consume one or more sugar sweetened beverage more than once a day. We explored the feasibility of Kentucky State Legislators adopting a 20% fiscal policy on SSBs as a deterrence to consumption of SSBs in order to reduce obesity and T2D rates and generate revenue for the state. We used the Kingdon's multiple stream policy framework to analyze problems and political factors that will enable or hinder the Legislation. Decision analysis framework was used to analyze economic benefits and the uncertainties about the policy. We found that, a 20% tax increase on SSBs, will save \$6,106 per quality of life (QALYS) gained per person and an estimated cost saving of about \$26.2billion for the state. This finding establishes a positive impact in terms of QALYs, cost savings and revenue generation to improve on built environment in the state. It also provides a roadmap for policy entrepreneur and legislators to initiate this policy.

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## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **The Young Child Brief Behavioral Screen: Psychometric Properties**

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**Abstract:** Background: Early identification of disruptive behavior problems is crucial to reduce serious long-term consequences in children. Accurate brief screening methods could improve early diagnosis of behavior problems for children, particularly in primary care settings. This study explored the validity and reliability of the 7-item parent-report Young Child Brief Behavioral Screen (YCBBS). Methods: Parents (N=195) of children ages 3-5 seen at a university pediatric primary care clinic completed the YCBBS at baseline and at 2-week follow up and completed additional child assessment measures. Descriptive and psychometric analyses are reported. Most parents were white (67%), biological (94%), mothers (89%) with at least a high school diploma (89%), and target children were nearly equally distributed between males (52%) and females (48%). Results: Internal consistency of the YCBBS was high (Cronbach's  $\alpha = .79$ ), and test-retest reliability was high ( $r = .71$ ,  $p < .001$ ). In addition, the criterion-related validity of the YCBBS was supported via positive correlations with scores on the Oppositional Defiant Disorder and Conduct Disorder subscales of the Early Childhood Inventory (.59,  $p < .001$  and .52,  $p < .001$ , respectively). Known groups validity was also supported: baseline YCBBS scores were significantly higher among parents who believed their child had behavioral problems ( $M = 5.52$ ,  $SD = 3.40$ ) compared to those who did not ( $M = 2.54$ ,  $SD = 2.01$ ;  $t(184) = 7.42$ ,  $p < .01$ ). Receiver operating curve (ROC) analysis demonstrated good accuracy of the screening tool in differentiating children with versus without disruptive behavior disorders based on ECI scores ( $AUC = .83$ ). Conclusions: There is evidence for both criterion and known groups validity, internal consistency reliability, and test-retest reliability of the YCBBS. This ultra-brief screening tool has the potential to increase early identification of various disruptive behavior problems in young children, with promising sensitivity and specificity demonstrated through ROC analyses. Future studies will explore implementation of the YCBBS in primary care settings.

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## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **Developing a County-Level Index Score for Opioid Abuse Indicators in Kentucky**

Author(s): P. J. Ward, Kentucky Injury Prevention and Research Center, U of Kentucky

**Abstract:** Background: The drug overdose mortality rate in Kentucky increased by 20% between 2014 and 2015, from 24.7/100,000 to 29.9/100,000, driven by opioid abuse. There are many factors used to assess the burden of the opioid epidemic, but an encompassing, individual index combining key factors would simplify the characterization of the opioid epidemic. The following study develops a single, county-level index that assesses the burden of the opioid epidemic across Kentucky. Methods: Kentucky counties were ranked on five opioid abuse indicators (mortality rate, emergency department visit rate, hospitalization rate, neonatal abstinence syndrome [NAS] rate, and rate of patients receiving greater than 100 morphine milligram equivalents [MME] per day). The average rank of the indicators was calculated, creating an opioid abuse index score for each county. Choropleth maps were produced to visualize the scores and hot spot analysis was performed. Results: The northern Kentucky and Appalachia regions had the highest opioid abuse index scores, with lowest scores in western Kentucky. The hot spot analysis confirmed this result, with hot spots at the  $\alpha=.05$  significance level in northern Kentucky and hot spots at the  $\alpha=.01$  significance level in Appalachia. Counties with the highest index scores were Floyd (mean rank 107), Powell (106.6) and Whitley (105.8), all of which are in Appalachia. All three ranked above 100 in hospitalization rate and NAS rate. Discussion: This analysis presents an encompassing opioid abuse index score at the county level in Kentucky. The results were used by public health practitioners to identify communities of focus and service gaps in the opioid epidemic.

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## College of Public Health Research Day

### ORAL PRESENTATION

Abstract Title: **Spatial distribution of partner-seeking men who have sex with men (MSM) in a mid-size city in the South: An epidemiologic study geosocial networking applications users**

Author(s): A. Algarin, Department of Epidemiology, U of Kentucky  
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**Abstract:** Background: Geosocial networking (GSN) applications (apps) have made finding sexual partners easier, raising challenges for HIV/STI prevention but also providing opportunities for research. To date, little is known about app usage in smaller cities where there may be more stigma surrounding MSM. Objective: This study uses GSN apps to identify areas with high density partner-seeking MSM, and to characterize these areas using Census block-group demographic measures in a Southern mid-sized city. Methods: Data collection points (n=62) were spaced in two-mile increments along nine routes (112 miles) covering the area. At each point, staff recorded the number of users within one mile using three GSN apps during two time periods. Data was entered into ArcGIS and Bayesian Empirical Kriging was used to create a raster estimating the number of app users throughout the county. Raster values were summarized for each of the county's 208 census block-groups and used as the outcome measure (i.e., GSN app usage). Negative binomial regression examined census block-group variables associated with GSN app usage. Results: In adjusted analyses of census block-group data, increased median income was negatively associated with GSN app usage ( $p < 0.001$ ). In addition, increased population density was positively associated in one of the three apps for night ( $p = 0.048$ ) and day ( $p = 0.021$ ). Race, ethnicity, and age distribution were not associated with area-level GSN app usage. Conclusion: In this mid-sized city, GSN app usage was highest in areas with lower income. This implies that interventions using GSN apps could be missing areas of higher income.

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## College of Public Health Research Day

### POSTER PRESENTATION #225

Abstract Title: **Do numbers matter? Comparing single homicide followed by suicide and multiple homicide followed by suicide using the National Violent Death Reporting System, 2003-2012.**

Author(s): C. Blondino, College of Public Health, U of Kentucky  
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**Abstract:** INTRODUCTION: Homicide-followed-by-suicide or homicide-suicides were examined to understand the dynamics of acting outwardly and inwardly violent in a single incident. The purpose of this study was to identify if certain circumstances had an association with the number of victims per homicide-suicide incident. This study reflects an important public health issue by encouraging an accurate viewpoint of homicide-suicide in order to properly program prevention efforts. METHODS: Using the restricted access data (RAD) from 17 NVDRS states, we characterized 1904 homicide-suicide incidents through qualitative and quantitative analysis based on victim and suspect demographic information, method of injury, and circumstantial information. Linear and logistic regression modeling was utilized to better understand the association with the victim count and the number of circumstances per incident as well as type of circumstance in a homicide-suicide incident. RESULTS: Suspects were predominantly white, male, and 35-54 years of age, with the main method of injury being a firearm. For every circumstance of family violence, an increase in the number of victims per incident can be expected. The odds of a single homicide-single suicide (two total victims) were greatest when family violence preceded or was a part of the incident while the odds of a mass fatality (four or more total victims per incident) were greatest when the victim and suspect had some type of relationship. DISCUSSION: This study provides insight into understanding homicide-suicide. The continuation of NVDRS surveillance is critical especially with current limitations of the availability, completeness, and timeliness of the data.

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## College of Public Health Research Day

### POSTER PRESENTATION #226

Abstract Title: **Occupational Airborne Particulate Exposure and Pulmonary Obstruction: a Proportionate Mortality Analysis**

Author(s): N.B. Horsley, Department of Epidemiology, U of Kentucky  
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**Abstract:** Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the United States. The greatest risk factor for the development of COPD is cigarette smoking. However, occupational exposure to vapors, gases, dusts, or fumes (VGDFs), in combination with smoking, significantly increases the risk of developing COPD. The literature suggests that the population attributable fraction (PAF) of occupational VGDF exposure for those with obstructive impairment of the lungs ranges from 0.15 for smokers to 0.53 for never smokers. Amongst agricultural workers, pesticide exposure has been found to cause significantly elevated rates of annual decline in lung function, approximately 6.9 mL/year in forced expiratory volume in one second (FEV1). Furthermore, the literature states that a higher risk of both ischemic and hemorrhagic stroke exists in subjects with COPD; indeed, after an acute severe exacerbation episode, those with COPD had an over six-fold increase in stroke risk. It is hypothesized that, when compared to the standard population, significantly elevated mortality rates of workers in "dusty" occupations exist, due to the pulmonary obstruction caused by workplace VGDF exposure. Death certificate data from Kentucky Vital Statistics are used. NIOSH Life Table Analysis System (LTAS) data will be used to calculate expected death in each category, controlling for age, gender, and race. Proportionate mortality ratios (PMRs) will be calculated for each industry classification (construction, coal mining, agriculture (crop production), and agriculture (livestock production)) by dividing actual deaths by the expected number of deaths. Statistical significance of the PMRs will be determined assuming a Poisson distribution and 95% confidence intervals.

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## College of Public Health Research Day

### POSTER PRESENTATION #227

Abstract Title: **How is Sensory-based Intervention Used in Dementia Care? A Scoping Review**

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**Abstract:** Alzheimer's disease and related dementias present significant changes in function, safety, and independence creating increased necessity for caregiver and medical care. Behavioral phenotype associated with the disease has been identified to decrease individuals' engagement with the environment, and create significant caregiver burden. Medications used to treat neuropsychological behaviors often come with serious side effects, including risk of death, altered alertness, and decreased functional engagement within the environment. Sensory-based interventions are a nonpharmacological option to decrease problematic behaviors and increase comfort whereby improving environmental, social and community participation for the individual and caregiver. The current study uses scoping review methods to evaluate current evidence for sensory-based interventions in dementia care. Database searches in CINAHL, Medline, PsychINFO, and ERIC, and individual journal search in American Journal for Occupational Therapy returned 752 articles. Articles were assessed for relevance, credibility, and rigor. Final results include 15 articles. Investigators analyzed articles for themes and conclusions. Findings indicate successful use of sensory-based interventions in current dementia research as 1) a component within multi-intervention studies; 2) monosensory stimulation; or 3) multisensory-based interventions. The use of sensory-based interventions presents an option for behavioral management in dementia care; however, there is a lack of consistency and protocol. Conclusions of this scoping review reveal a need to define sensory-based intervention usage and protocol development for enhanced environmental engagement and comfort of individuals with Alzheimer's disease and related dementia.

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## College of Public Health Research Day

### POSTER PRESENTATION #228

Abstract Title: **Infant Mortality Rates among Home Visiting Participants**

Author(s): C. Williams, U of Kentucky  
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**Abstract:** While the U.S. infant mortality rate (IMR) was 5.96 infant deaths per 1,000 live births in 2013, the IMR for Kentucky was 6.39 or 356 infant deaths. Infant mortality is associated with maternal health, access to medical care, and socioeconomic conditions. This study compares infant deaths among women who did and did not receive home visiting services. The Kentucky Health Access Nurturing Development Services (HANDS) program is a state-developed, evidence-based home visitation program. HANDS administrative data and live birth and death certificate records will be used to analyze all infant deaths from 1/1/2005-12/31/2014 in Kentucky. Four groups of women will be compared: 1) women who were referred to HANDS and received at least one visit; 2) women referred to HANDS but did not receive a visit; 3) demographically similar women who were not referred to HANDS; and 4) all other women. Results will be further stratified by those receiving prenatal home visits and those who enrolled after birth. Infant deaths occurring in the hospital are lower among HANDS participants (0.1% compared to 2.1%;  $p < 0.001$ ). Over the study period, 243 infant deaths were recorded in the HANDS administrative database; the study will also assess how well infant deaths are self-reported to home visiting staff. While preliminary evidence demonstrates home visiting reduces infant mortality, particularly because of reductions in prematurity and low birth weight, these studies are limited by small samples. By using multiple years of data, we are able to analyze a large sample with more stable estimates.

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## College of Public Health Research Day

### POSTER PRESENTATION #229

Abstract Title: **Effect of Water and Sanitation Access on Childhood Health in Peru**

Author(s): A. Ballard, College of Public Health, U of Kentucky  
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**Abstract:** Aim: to assess the effect of improved water and sanitation infrastructure development and improvement efforts on child morbidity using diarrhea in children under five in Peru. Methods: To determine the association between access to water and sanitation and child health, Peruvian Demographic and Health Surveys (DHS) child and household data was used. Logistic regression models were used to assess the impact of access or lack of access to improved water and sanitation on child morbidity. Results: This study found associations between diarrhea in children under 5 and improved drinking water access (OR: 0.790), living in Lima metro (OR: 0.632), the Coast (OR: 0.466), and Sierra (OR:0.579) compared to the rainforest, being rich (OR: 806) rather than poor, age of child, and mother's age. Improved sanitation access was not statistically significant. Conclusion: Wealth and natural region appear to be the driving factors in relation to diarrhea along with type of drinking water. However, upon further research of Peruvian regions, it appears that multifactorial causes could be at play. Specifically, the rainforest region of Peru has the highest rates of diarrhea and also has the highest proportion of poor people, but oil spills are also abundant in this region. Reports from 2011 show that there were at least 90 oil spills over 3 years in northern Peru's Amazon rainforest. Although this relationship is only speculative, it seems minimally that childhood diarrhea in Peru has multifactorial causes.

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## College of Public Health Research Day

### POSTER PRESENTATION #230

Abstract Title: **Alternative Randomization Strategies for Seamless Phase I/II Adaptive Design for Trials of Novel Cancer Treatments**

Author(s): D. Yan, College of Public Health, U of Kentucky  
E.V. Dressler Markey Cancer Center, U of Kentucky

**Abstract:** In this article, we propose an alternative strategy for randomization on a recently proposed seamless phase I/II adaptive design. The original design by Wages and Tait in 2015 was proposed for trials of molecularly targeted agents in cancer treatments, where dose-efficacy assumptions are not always monotonically increasing. We alter the calculation of dose-randomization probabilities with the goal to improve the design's performance. The proposed randomization strategy calculates randomization probabilities using the likelihood of every candidate model to as opposed to the original design that selects the best model and then randomize based on estimations from the selected model. Simulations show that under most scenarios, our revised method of randomization allocates more patients to the optimal dose while maintaining approximately the same level of accuracy in selecting the optimal dose without increasing the risk of toxicity. By using the revised randomization strategy, the number of patients allocated to the optimal dose is increased by approximately 10% on average. The proposed randomization strategy is most appropriate when dose-efficacy is not monotonically increasing.

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## College of Public Health Research Day

### POSTER PRESENTATION #231

Abstract Title: **Motocross For Malaria**

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**Abstract:** 40% of deaths in Chad are due to malaria, the majority in rural areas, which represents 78% of the total population. The rough terrain makes it hard to reach remote communities by regular vehicles all year round. The solution is to partner with local trained nurses and clinicians in hospital districts in order to provide free malaria screenings, treatments, and prevention in these remote communities by motocross. Every Monday, from the hospital, 2 teams of 2 nurses will load motocross with malaria rapid tests, medication, and mosquito nets to go to the chosen village and examine 60 patients. If tested positive, they will be treated. Malaria prevention will be done through skits in the village's language. Riders for Health is a nonprofit organization created by Andrea and Barry Coleman that operates in seven African countries. They showed that bringing treatments by motocross in rural areas decreased the rate of malaria by 21% in the Binga district of Zimbabwe, compared to 44% increase in another district where motocross were not used. We will treat 2,400 people within the first year. Nurses will use Medic Mobile, an electronic medical record system that works on basic phones without connectivity, to collect patients' data for cases surveillance. Follow-up care will be provided the week following the first visit, with update of our records, which will be used to evaluate our services' quality.

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## College of Public Health Research Day

### POSTER PRESENTATION #232

Abstract Title: **Mental Health Intervention During Crises and War time. Public Health Challenges in the Middle East.**

Author(s): M. Elias, Departments of Internal Medicine, Nephrology Division, U of Kentucky

**Abstract:** Among the consequences of war, the impact on the mental health of the civilian population is one of the most significant. Studies of the general population show a definite increase in the incidence and prevalence of mental disorders. Women are more affected than men. Other vulnerable groups are children, the elderly and the disabled. Prevalence rates are associated with the degree of trauma, and the availability of physical and emotional support. The use of cultural and religious coping strategies is frequent in developing countries. Psychological distresses emerged after civil war: Homesickness, displacement, instability; Child and women abuse (Rape, domestic violence); Depression; Anxiety; Host communities' rejection towards Refugee existence. Major Mental Health Interventions: Individual/Group therapy; Psychological activity for kids. Objective of intervention; case study analysis, differential diagnose, decide whether Individual/Group therapy needed Treatment; either behavioral, medical, both; Referral for suicide cases, Internal, and external referral. Main Challenges of Public health in the Middle East is: Lack of research, lack of public health specialist, lack of well-trained counselor (Psychologist, sociologist.) Conclusion and Recommendations: A number of issues have emerged from the extensive work on the prevalence and pattern of mental health effects of war and conflict situations. Are the psychological effects and their manifestation universal? What should be the definition of a case requiring intervention? What is the long-term course of stress-related symptoms? All these issues need to be addressed by future studies. Training mental health professionals and creating sustainable intervention programs are urgently needed. Studies are consistent in showing the value of both physical and psychological support in minimizing the effects of war-related traumas, as well as the role cultural practices as ways of coping with the conflict situations.

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## College of Public Health Research Day

### POSTER PRESENTATION #233

Abstract Title: **On the Use of Optimally Weighted Estimating Equations to Improve the Marginal Analysis of Longitudinal Data in the Presence of Time-Dependent Covariates**

Author(s): I-C. Chen, Department of Biostatistics, University of Kentucky  
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**Abstract:** Generalized estimating equations (GEE) are commonly utilized for the marginal analysis of longitudinal data. In order to obtain consistent regression parameter estimates, these estimating equations must be unbiased. However, when utilizing certain types of time-dependent covariates, these equations can be biased unless the independence working correlation structure is utilized. Moreover, in this case, regression parameter estimation can be very inefficient because not all valid moment conditions are incorporated within the corresponding estimating equations. Therefore, approaches utilizing modified versions of GEE or quadratic inference functions have been proposed in order to utilize all valid moment conditions. However, such methods either lack efficiency or require correct specification of the type of time-dependent covariate. Therefore, we propose an empirical approach to optimally weight the estimating equations corresponding to time-dependent covariates, with the goal of minimizing the mean squared error of regression parameter estimates. Resulting estimates are consistent and estimated with the greatest possible efficiency. Existing and proposed methods are compared in a simulation study and application example.

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## College of Public Health Research Day

### POSTER PRESENTATION #234

Abstract Title: **Severe headaches are not associated with vitamin D deficiency in a national representative adult sample**

Author(s): M.V. Rojas-Ramírez, Department of Biostatistics, College of Public Health, U of Kentucky  
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**Abstract:** Aim of Investigation: Vitamin D deficiency has been linked to many conditions including headaches. The existing literature yields mixed results and the relationship between vitamin D deficiency and headache remains uncertain. The aim of this study was to determine whether an association exists between these two factors using 2003-2004 NHANES data. Methods: A nationally representative sample of 10,122 adults age 20 to 85 were analyzed. Laboratory blood samples of vitamin D serum levels were correlated to respondent's headache and current health status, alcohol use, and other demographic characteristics via multivariate logistic regression. Backward elimination technique was used to reach the most parsimonious model. Results: 21% (95% CI, 19.7-24%) percent of adults reported having migraine or other severe headache in the past 3 months prior to the NHANES interview. Among them, 30.3% had normal Vitamin D levels, 34.7% had deficient Vitamin D levels, and 35% had insufficient Vitamin D levels. Based on our logistic regression model, neither Vitamin D deficiency nor insufficiency were associated with headache status ( $P = 0.936$ ,  $P = 0.875$  respectively). Conclusions: Using a large nationally representative sample, we found no evidence that vitamin D deficiency may increase risk of subject's headaches. Nevertheless, our findings highlight a potential public health problem due to a high prevalence of US adults with vitamin D deficiency or insufficiency that could play a role in other medical conditions and deserve further exploration.

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## College of Public Health Research Day

### POSTER PRESENTATION #235

Abstract Title: **A Predictive Probability Interim Design for Phase II Clinical Trials with Continuous Endpoints**

Author(s): M.Liu, Department of Biostatistics, U of Kentucky  
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**Abstract:** Molecular targeted therapies come often with lower toxicity profiles than traditional cytotoxic treatments, thus shifting drug development paradigm into establishing evidence of biological activity and target modulation in early phase trials. Therefore, these trials need to address simultaneous evaluation of safety, proof-of-concept biomarker activity or changes in continuous tumor size instead of binary response rate. Interim analyses are typically incorporated in the trial due to concerns regarding excessive toxicity and ineffective new treatment. There is a lack of interim strategies developed to monitor futility and/or efficacy for these types of continuous outcomes, especially in single-arm phase II trials. We extend Lee and Liu's predictive probability design (2008) into two-stage setting for continuous endpoints, assuming normal distribution with known variance. Simulation results and case study demonstrated the proposed design can incorporate an interim stop for futility while maintaining desirable design properties for both optimal and minimax designs, with reduced sample size. A limited exploration of various priors was performed and shown to be robust. As research rapidly moves to incorporate more molecular targeted therapies, it will accommodate new types of outcomes while allowing for flexible stopping rules to continue optimizing trial resources and prioritize agents with compelling early phase data.

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## College of Public Health Research Day

### POSTER PRESENTATION #236

Abstract Title: **Rare Variants associated with Alzheimer's Disease**

Author(s): Y. Katsumata, Department of Biostatistics, U of Kentucky  
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**Abstract:** Alzheimer's disease (AD) is the most common form of dementia, accounting for over 50% of dementia cases. Recently, 21 distinct single nucleotide polymorphisms were reported to be associated with AD via genome-wide association studies (GWAS). GWAS, however, targets the "common disease – common variant" hypothesis which narrows the focus of genetic discovery. Advances in sequencing technologies enable us to accurately determine rare variants and to improve our understanding the role of both common and rare variants in the underlying biological mechanisms. To learn more about genetic association of rare variants with AD, we calculated a scan-statistic-type test to discover rare variant effects on neurofibrillary degeneration assessed with Braak staging. Whole exome sequencing data in this study came from the Alzheimer's Disease Sequencing Project (ADSP). In order to reduce misclassification, we denoted individuals who had Braak stage V or VI and died at age 65 years or older as an AD case, and individuals who had Braak stage 0 to III and died at age 80 years or older as an AD control. Of the total 2,946 subjects, 1,398 were cases, 1,633 were female, and 983 were APOE  $\epsilon$ 4 carriers. We identified two 2 kilobase windows that were enriched with rare risk variants on the immunoglobulin heavy chain gene in APOE  $\epsilon$ 4 non-carriers, and two windows on the NXNL1 gene in APOE  $\epsilon$ 4 carriers. In the future studies, we need to elucidate the biological roles of these regions.

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## College of Public Health Research Day

### POSTER PRESENTATION #237

Abstract Title: **An Extensive Comparison of Bias-Corrected Empirical Covariance Estimators with Generalized Estimating Equations in Small-Sample Longitudinal Study Settings**

Author(s): W.P. Ford, Departments of Biostatistics and Epidemiology, College of Public Health, U of Kentucky  
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**Abstract:** Data arising from longitudinal studies are commonly analyzed with generalized estimating equations (GEE). Previous literature has shown that liberal inference may result from the use of the empirical sandwich covariance matrix estimator when the number of subjects is small. Therefore, two different methods have been used to improve the validity of inference. First, many different small-sample corrections to the empirical estimator have been offered in order to reduce bias in resulting standard error estimates. Second, critical values can be obtained from a t-distribution with approximate degrees of freedom. Although studies on the comparison of these small-sample corrections and degrees of freedom have been published, there is need for a comprehensive study of currently existing methods in a wider range of scenarios. Therefore, in this manuscript we conduct such a simulation study, finding a recently proposed method by Westgate and Burchett (2016, *Statistics in Medicine* 35, 3733–3744) that specifies both a covariance estimator and degrees of freedom and an average of two popular corrections developed by Mancl and DeRouen (2001, *Biometrics* 57, 126–134) and Kauermann and Carroll (2001, *Journal of the American Statistical Association* 96, 1387–1396) with  $N - p$  degrees of freedom, where  $N$  represents the number of subjects and  $p$  represents the number of parameters in the marginal model, to attain nominal type I error rates more consistently than other methods in a variety of settings.

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## College of Public Health Research Day

### POSTER PRESENTATION #238

Abstract Title: **Increase in Exercise Activities in Alpha-1 Antitrypsin Deficient Patients: Results of a Randomized Trial**

Author(s): R.Choate, Department of Preventive Medicine and Environmental Health, U of Kentucky  
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**Abstract:** Background: Alpha-1 Disease Management and Prevention Program (ADMAP) provides benefits in quality of life and healthcare utilization to patients with Alpha-1 Antitrypsin deficiency (AATD). However, in initial studies, many participants of ADMAP demonstrated no improvements in their activity levels. The Step Forward Study (SFS) was designed to identify whether more intensive fitness intervention would improve physical activity and weight outcomes. Methods: SFS is a randomized double-blinded controlled 1:1 trial of intensive distant intervention in patients with AATD. In addition to participating in ADMAP, respondents in the intervention group received educational materials promoting physical activity, nutritional guidance and exercise aids (e.g., Therabands, weights, peddlers, etc.). Primary outcome was self-reported number of exercise minutes per week. The present analyses included 417 participants who recorded minutes of warm-up, cardio, and strength exercise in their weekly diaries provided by AlphaNet. Average minutes of exercise in total and by type were analyzed stratified by the intervention group. Values between the groups were compared using t-test and ANOVA, and Chi-squared test respectively utilizing SAS v9.4. Results: Participants in the control group (n=205, mean age 57.9+9.6, 45.9% males) reported 31.5 (SD=4.2) monthly average exercise minutes. Participants in the intervention group (n=212, mean age 58.0+9.3, 49.1% males) reported 35.5 (SD=3.3) monthly average exercise minutes which was significantly greater than in the control group (p<0.0001). There was no significant difference between the intervention groups in mean monthly minutes stratified by exercise types. Conclusion: Adding intensive fitness intervention to ADMAP resulted in increased exercise activities among AATD patients.

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## College of Public Health Research Day

### POSTER PRESENTATION #239

Abstract Title: **Referrals to Early Intervention Services for Infants Diagnosed with Microcephaly Residing in Metropolitan Atlanta, Georgia, 2008-2014**

Author(s): M. D. Politis, Epidemiology, U of Kentucky  
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**Abstract:** Background: Microcephaly, a birth defect characterized by an abnormally small head and recently linked to maternal Zika virus infection, leads to intellectual disabilities and developmental delays. Theoretical Framework: Early identification and referral leads to timely delivery of services to children and youth with special health care needs. Georgia's Children 1st (C1st) program screens and refers at-risk children to early intervention services such as Babies Can't Wait (BCW) program. Research Questions: How many microcephalic infants residing in metropolitan Atlanta were identified and referred to services? How many infants referred to BCW had an Individualized Family Service Plan (IFSP) created within 45 days of referral? Methods: Microcephalic infants born in 2008-2014 residing in Clayton, Cobb, DeKalb, Fulton, and Gwinnett counties were identified from hospital-submitted birth defects surveillance case reports. Infants in these reports were linked to their birth certificate, C1st, and BCW records. Chi-square test was used to evaluate racial differences of successful BCW referrals as measured by the percentage who had an IFSP within 45 days of referral. Results: Of 308 infants identified, 236 (77%) were referred to C1st and 188 (61%) were referred to BCW. A lower percentage of Black infants (52%) had an IFSP created within 45 days of BCW referral compared to White infants (82%) and infants of other races (78%), which was statistically significant ( $p=.001$ ). Conclusion/Implications for Practice: These findings establish baselines for improving referrals to services for microcephalic infants. Observed racial disparities in timely initiation of services should be addressed by identifying and removing systemic barriers.

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## College of Public Health Research Day

### POSTER PRESENTATION #240

Abstract Title: **Millennial's and Suicide: An Ecological Study of Suicide Trends in those ages 18-24 in Kentucky**

Author(s): M. McCarthy, Department of Epidemiology, College of Public Health, U of Kentucky  
J. Seals, Department of Epidemiology, College of Public Health, U of Kentucky  
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**Abstract:** Introduction. Millennial's consist of people ages 14-34 (born 1980-2000.) Suicide rates have increased significantly over the last 20 years. This study will examine why suicide rates have reached an all time high and what risk factors are contributing to this rise. We focused specifically in the millennial age group compared to three other age groups between 2010 and 2014 in Kentucky. Methods. Data for the state of Kentucky from the National Violent Death Reporting System (NVDRS) were used for this ecological study of selected age groups in Kentucky (n=1362). Age groups were sampled in the following way: Millennial: 18-24, Generation X: 35-41, Baby Boomers: 55-61, Greatest Generation and Silent Generation: 72 and older. Results. Suicides with reported intimate partner problems doubled in Millennial's from 2010-2012 and substance abuse problems tripled. Of the suicides 17% were female (235) and 83% (1140) were male. Generation X had the highest reported number of decedents an alcohol problem every year and Generation X and Baby Boomers had higher substance abuse problems than Millennial's. Discussion. Substance abuse and intimate partner problems were the areas of largest change among the Millennial's age group. Due to this data being from NVDRS data the circumstantial evidence may not be fully captured due to the nature of how the data is collected by the state coroners. Further research is needed to see the extent of how these trends will continue to change and the full impact they are having on suicide.

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## College of Public Health Research Day

### POSTER PRESENTATION #241

Abstract Title: **Evaluating the Relationship Between Diabetes and Menstrual Cycle Irregularities**

Author(s): K.L. Conner, College of Public Health, U of Kentucky

**Abstract:** Menstrual cycle irregularities are an often-overlooked aspect of a woman's health that carries a high patient burden. There is a large gap in the literature concerning epidemiological analyses of populations reporting irregular menstruation. Using data from the Kentucky Women's Health Registry (KWHR) from 2006 to 2014, a logistic regression analysis was conducted to determine whether comorbid health conditions, specifically diabetes, were associated with the odds of diabetic woman self-reporting menstrual cycle irregularities. After restriction based on age (less than 45 years), 16,875 observations were considered for analysis. The average age of a woman reporting menstrual irregularities was approximately 36 years of age, compared to 34 for a woman reporting no menstrual irregularities. An initial cross-tabulation of the data showed 6.07% of women reporting diabetic status and 20.05% of women reporting irregular menstrual cycles; among the diabetic women, 1.66% reported menstrual cycle irregularities, compared to the 18.39% of nondiabetic women that reported menstrual cycle irregularities (p-value less than 0.0001, using a chi-square analysis). Unadjusted analysis showed an odds ratio of 0.65 for diabetic women self-reporting irregular menstruation.

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## College of Public Health Research Day

### POSTER PRESENTATION #242

Abstract Title: **Kentucky's Homicide and Suicide Trends Examined by Stream Analogy For Lethal Violence, 2005-2014**

Author(s): J. Seals, College of Public Health, U of Kentucky  
S. Brown, College of Public Health, U of Kentucky

**Abstract:** Introduction: Over 57,000 homicides and suicides occurred in the US in 2014 with suicide rates on the rise. Stream analogy for lethal violence examines homicides and suicides as forms of lethal violence expressed in alternative manners. The purpose of this study was to use stream analogy to predict trends of lethal violence. Methods: Kentucky Violent Death Reporting System data from 2004-2014 were used in this ecological study of lethal violence (N = 7848). Regression models were used to examine spatial clusters of lethal violence and predict events leading to lethal violence and the expression of homicide or suicide. Results: More perpetrators of lethal violence are male (76%) and white (80%). The hazard of lethal violence increased with high school completion rates (12.76, 95%CI 2.35, 69.28) and rurality (2.80, 95%CI 1.82, 4.30). A black perpetrator increased the odds that the lethal violence was expressed as homicide (20.99, 95%CI 17.75, 24.82). While controlling for confounding victim substance abuse increased the odds of a suicide expression (3.89, 95%CI 2.26, 6.69). Clusters of lethal violence varied geographically, and reflected high/low clusters of suicide/homicide ratios. Discussion: Predicting how people at risk will express lethal violence will help reduce both suicides and homicides. Some risk factors for lethal violence and how lethal violence is expressed are currently big issues in Kentucky. Due to the ecological design and nature of the study data set further research is needed on those who commit homicide to better predict when an act of violence will be expressed inwardly or outwardly.

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## College of Public Health Research Day

### POSTER PRESENTATION #243

Abstract Title: **Can Music Be a Preventative Mechanism for Cognitive Impairment: A Scoping Review**

Author(s): C. Schneider, Graduate Center for Gerontology, U of Kentucky  
B. Hunter, Sanders Brown Center on Aging, Graduate Center for Gerontology, U of Kentucky  
S. Bardach, Graduate Center for Gerontology, U of Kentucky

**Abstract:** The aging population is growing rapidly, encompassing a large proportion of older adults living with cognitive impairment. Increasingly more people will live with cognitive deficits in the future. Currently there is little evidence indicating highly effective interventions that prevent or slow the onset of cognitive impairment. Music playing has been shown to influence brain and cognitive function as it activates multiple brain areas; music playing uses cognitive and motor functions as well as multiple sensory systems, simultaneously. The purpose of this study was to conduct a scoping review of literature focusing on cognition and music to determine if there is sufficient evidence that music interventions and or training can protect older adults from cognitive impairment. Four databases were searched including PsychINFO, Web of Science, PubMed and Cochrane. The following search terms were used: music, music therapy, cognitive impairment, cognition, cognitive protect and cognitive disorders. Inclusion criteria were: human subjects 50 years of age and older, inclusion of interventions having to do with music, and examination of cognitive outcomes. Thirteen studies met this criteria and were included in the review. The majority of studies indicated that music influences cognitive aging positively. Only three studies indicated level I evidence; more high quality research is needed in this area in order to understand the mechanisms behind potential protection of music including causational evidence of music's ability to influence age-related cognitive change in older adults.

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## College of Public Health Research Day

### POSTER PRESENTATION #244

Abstract Title: **A Systems Approach to the Problem of Falls in Old Age**

Author(s): P.A. Dillon, Graduate Center for Gerontology, U of Kentucky

**Abstract:** The problem of falls in old age is enormously costly and disruptive for the older individual, others, and society; its severity is likely to intensify as our population ages. An implied assumption of conventional fall prevention strategies is that the problem of falls is reducible to one or more component fall risk factors. This reductionist approach is questioned because it corresponds poorly to how human postural stability arises as a systems-feature that is not fully explained by component parts. Consonant with the holistic nature of postural control is a systems approach. A systems approach explains the phenomenon of postural instability in old age as the gradual decline of a postural control system's ability to adapt to intrinsic and environmental threats. Falls in old age emerge as the result of this decline in system adaptability. A dynamic systems theoretical framework serves to guide understanding and research into the systems-nature of postural stability, by using non-linear quantitative measures of postural sway as tools for insight into systems-level adaptability. Realizing that falls arise from a complex dynamic system of interacting components of various levels and domains makes it imperative to investigate interventions aimed toward synergistically fostering robust postural control. This perspective identifies Tai Chi as an example of a systems-oriented intervention for ameliorating the problem of falls in old age.

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## College of Public Health Research Day

### POSTER PRESENTATION #245

Abstract Title: **The Process of Divorce: A Time Based Process Model**

Author(s): M.W. Schuier, Graduate Center for Gerontology, U of Kentucky

**Abstract:** Using a population based dataset, divorce is examined as a process rather than a singular event. Researchers at the University of Kentucky have gathered divorce data using divorce records from the Lexington-Fayette courthouse. Divorce is viewed and explored as a process that starts the date marriage begins and ends with the lawful finalization of divorce proceedings. Events (marriage, separation, filing for divorce, and finalization of divorce) are influential points in time that are examined as a time based dynamic of divorce within the dynamics of the family. The length of time between these events is used as an indicator of the process someone goes through while experiencing divorce. Age, gender, length of marriage, and the presence and ages of children are analyzed as to their influence on the process of divorce. Findings cover the aforementioned individual factors and their impact on the length of time between events that led up to the finalization of divorce. Using analysis of divorce and family dynamics a better understanding of divorce emerges. Discussion includes the impact multiple individual factors have on the time dynamic of divorce, and results in divorce being seen as more than a point in time but rather contextually dynamic. Finally, age is discussed in terms of how age influences the time-based process of divorce.

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## College of Public Health Research Day

### POSTER PRESENTATION #246

Abstract Title: **Beyond Care: Understanding the Meaning of Older Adults' Attachment to Their Pets.**

Author(s): R. L. Mueller, Department of Gerontology, College of Public Health, U of Kentucky

**Abstract:** Objective: The significance of pets in older adults' lives has been well-documented. The focus of such research has been on the emotional attachment older adults feel toward their pet and the many health benefits received as a result of this relationship. What is lacking is a theory of how an older adult's meaning of attachment to their pet affects their well-being and quality of life. Therefore, this study will utilize qualitative methods to generate a theory of attachment that focuses on the meaning of attachment to pets from the older adult pet owners' perspective. Study Design: This research design will employ two philosophically linked components: life course and grounded theory. Individual interviews will be conducted with 8 older adult pet owners followed by a series of 6 panel discussions that will focus on selected topics generated by the data collected in the individual interviews. Preliminary Data: Based on preliminary field research of 22 interviews with older adult pet owners that revealed that attachment to pets is a significant variable in determining the health benefits older adults receive from their pets, it became clear that the meaning of attachment to pets for older adults has neither been defined nor explained independent of using Bowlby's attachment theory. Expected Results: Upon conclusion of the study, the researcher will have a deeper understanding of the meaning of attachment to pets from the personal data gathered from the older adult participants with insight on how this contributes to their well-being and quality of life.

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## College of Public Health Research Day

### POSTER PRESENTATION #247

Abstract Title: **Lean in Healthcare: Time for Evolution or Revolution?**

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K.N. Lattimore, College of Public Health, U of Kentucky  
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S.S. Bishop, College of Dentistry, U of Kentucky

**Abstract:** Lean, an 8-step problem-solving process improvement approach developed by the Toyota Corporation, has received attention in the healthcare industry. The purpose of this project was to document the diffusion of this approach and examine the fidelity of its implementation. Towards these goals we completed a systemic search of the PubMed database and identified 492 articles. The majority of the articles were published in scholarly (70.7%) versus professional journals. The earliest publication date was 1996 and while the number of articles increased each year the recent trend reflects a maturity-to-decline stage. The most prevalent types of articles were empirical research (47.3%), commentary (25.4%) and tutorial (15.8%). Of the 233 empirical research articles, 92.4% were published in scholarly journals and described projects that were conducted hospital-wide (21.5%), in ambulatory settings (11.0%) and inpatient units (10.5%). Common project settings were ancillary care (e.g., radiology, laboratory, 16.0%), surgery (10.1%) and emergency/trauma care (8.4%). Most articles used case study or quasi-experimental designs. While most articles reported use of tools to clarify the problem (step 1) and breakdown the problem (step 2) fewer described utilizing tools associated with steps 3-8. A gradual shift from referencing "lean" to "lean and six sigma" to finally "lean six sigma" provided further evidence of the evolution of approaches. The articles described achievements toward the Institute on Healthcare Improvement's Triple Aim of improving the patient experience, improving the health of populations, and reducing the cost of healthcare. Whether these gains will be sustained and whether lean evolves or is replaced by a new approach remains to be seen.

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## College of Public Health Research Day

### POSTER PRESENTATION #248

Abstract Title: **Using Lean Thinking to Improve the UK Student Dental Clinic**

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**Abstract:** The UK Student Dental Clinic, a busy clinic located on the campus of the University of Kentucky, provides a full-range of patient care while meeting the training needs of both 3rd and 4th year dental students. A recent lack of basic cases in its patient mix sparked interest in utilizing Lean Thinking, a management philosophy first developed by the Toyota Corporation, to launch an examination of its current processes. The purpose of this research was to use lean tools to better understand current workflow processes and identify potential areas for improvement. Data were collected using the walk-through method and observation. The walk-through focused on understanding the experiences of patients scheduling screening appointments. The results of the walk-through depicted wide variation in the current process and informed the design of standardized protocols. During the observation phase members of our team shadowed dental students as they provided patient care. Data collected were analyzed using process workflow maps, spaghetti diagrams and the waste-walk method. These results as well as insights from the process owners were used to identify ideas to reduce waste and standardize processes. The next phases of the project involves collecting baseline measures of waiting time (e.g. waste) and a prioritizing improvement ideas. Waiting time (as well as patient mix) will be continually monitored through each small cycle of change with adjustment being made as needed.

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## College of Public Health Research Day

### POSTER PRESENTATION #249

Abstract Title: **Varying Performances in National Preparedness: FEMA Region IV**

Author(s): B. H. Spillman, College of Public Health, U of Kentucky  
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**Abstract:** Public health's central role in preparing for and responding to disasters and disease outbreaks aligns with the field's goals of improving population health through health promotion, injury and disease prevention, and the control of infectious diseases. The National Health Security Preparedness Index is a tool that brings together preparedness data from each U.S. state to assess health security surveillance, community planning and engagement, incident and information management, healthcare delivery, countermeasure management, and environmental and occupational health. The Index has identified downward trends nationally in environmental and occupational health [EOH], indicating a need for better understanding of state capabilities. This study examines Index findings in EOH among FEMA Region IV to identify potential contributors to within-region variation among states in this domain. Index data for the FEMA Region IV states for 2013, 2014, and 2015 were examined to identify drivers of variation in environmental and occupational health. The States were divided into "high-achievers" and "low-achievers" based on the overall scores in the EOH domain. Bar charts were used to display the number of States having each categorical value of specific measures within the domain for high and low achiever's groups. The graphic displays were generated using Stata. Analysis of FEMA Region IV measures indicate variation in such areas as environmental testing of different types between states that underperform and over-perform the national average. These varying capabilities contribute to variation in Index performance in EOH across states in Region IV. Findings can help states plan and prioritize activities, processes, and programs to address gaps, as well as identify peer-to-peer learning opportunities within the region.

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## College of Public Health Research Day

### POSTER PRESENTATION #250

Abstract Title: **Experiential Education through Design of Opioid Prevention Social Media Campaign**

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**Abstract:** Academic-community partnerships provide opportunities for project advancement for the community partner and experiential learning for students. To further the potential for these partnerships The Practice and Experiential Education Lab (PEEL) was piloted through Office of Practice and Experiential Education in the College of Public Health (CPH). The goal of PEEL is to provide a mechanism through which current CPH students, graduate and undergraduate, apply didactically acquired knowledge in the practice environment through small project completion with designated community partners. A recently completed PEEL project partnered PEEL students with Kentucky Injury Prevention Research Center (KIPRC) to design messaging to translate the Good Samaritan provisions in Kentucky's drug legislation for the targeted age-group. This project allowed KIPRC's goals of advancing the understanding of the Good Samaritan provision among high school and college age students with PEEL's objectives of engaging students in practical applications of classroom learning; providing tasks that students can successfully perform in developing a real-world, health-related social media messaging campaign; and to determine the successes and challenges experienced by public health professionals who partner with students to complete projects. The impact of this exercise on student learning outcomes and the experiences of the public health professionals who have worked with the students have been evaluated through a qualitative interview process. Through this project, we hope to strengthen the College of Public Health's ties to the community while improving the educational experiences of our students.

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