



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Heat Related Illnesses Among California Agricultural Workers

Alexandra E. Hill, University of California Davis, alihill@ucdavis.edu

***Selected Paper prepared for presentation at the 2018 Agricultural & Applied Economics Association
Annual Meeting, Washington, D.C., August 5-August 7***

Copyright 2018 by [authors]. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Elevated and increasing temperatures present difficulties for the health of California's large farming population, particularly the hired workforce who may face dangerous working conditions related to prolonged heat exposure.

Reports of dangerous working conditions related to heat have led to reforms in California's labor laws. For example, in 2005, California's Division of Occupational Safety and Health (Cal-OSHA) passed the Heat Illness Prevention regulation to protect outdoor workers from heat exposure. Most recently, in 2015, in the settlement of two lawsuits from families of agricultural workers who died of heat exhaustion, Cal-OSHA agreed to improve its auditing and enforcement of the 2005 regulation. Despite the growing interest in the safety of California agricultural workers, there has been no research that causally links agricultural labor in the state to common and severe heat-related illnesses.

This project studies the prevalence of heat related illnesses in California's agricultural workforce. To the best of our knowledge, this is the first study of heat related illnesses among California agricultural workers using clinical hospital data – rather than potentially biased employer reports. Our key research questions include: (1) How do prevalence rates of heat-related illnesses compare for urban and rural populations? For agricultural workers and non-agricultural workers? (2) How do hospital-reported heat illness rates among agricultural workers compare with employer reports? (3) What are the causal effects of temperature and labor intensity on the prevalence of heat-related illnesses among agricultural workers?

This project begins by simply documenting the prevalence of common heat-related illnesses in California's rural population, and then narrow our focus to examine rates of heat-related illnesses among agricultural workers. To measure outcomes, we use patient-level data from California hospitals and emergency rooms from 1990 – 2014. These data are provided by the California Office of Statewide Health Planning and Development (Cal-OSHPD).

Two conditions – high temperatures and high labor demands – are necessary to create the adverse working conditions that lead to heat related illnesses. The first is obvious, workers must be exposed to high temperatures to suffer heat related illnesses. The latter condition, however, is less straightforward. This relies on the assumption that hired laborers will work longer hours only when they are needed. We use variation in agricultural wages and crop prices as a proxy for labor intensity. When wages are high, workers have a direct incentive to work longer hours (e.g. longer days and working Saturdays), despite the high temperatures. Similarly, when prices are high for commodities with flexible harvest times (e.g. berries), producers have a direct incentive to keep workers in the fields longer.

To identify agricultural workers among the rural population, we use patient ethnicity, race, age, and principal language collected by Cal-OSHPD to predict the probability that they work in agriculture. To estimate this probability, we use the 1990-2014 ACS PUMS databases; for each year and public use microdata area (PUMA), we use a propensity score approach to predict the likelihood that the respondent works in agriculture based on race, ethnicity, and primary language. Combining this with monthly, county-level agricultural employment data, we estimate the likelihood that each patient works in agriculture based on month, geographical location, ethnicity, race, and principal language. Next, using county-level monthly agricultural

employment data from the California Department of Labor, aggregate monthly employment, and population estimates, we compare the rates of hospital visits at the county-month level for agricultural workers and others in a nearby geographical location.

In addition to short-run impacts, we will also consider the effects of long run exposure to working in high temperatures. While some media attention has focused on the prevalence of heat stroke among agricultural workers, work by scholars in Central America has also drawn attention to a less well publicized condition: Chronic Kidney Disease (CKD). Public health scholars have previously investigated high rates of CKD in Central America. CKD is a disease normally attributed to obesity, diabetes, and hypertension; however recent studies have found that high rates of CKD found in Central American countries can be attributed to severe heat stress and dehydration (Brooks, et al. 2012; Peraza, et al. 2012; and Laws, et al. 2015). CKD seems to occur in coastal regions extending from southern Mexico to northern Costa Rica. Epidemiological work suggests that the disease is linked to occupation; notably, prevalence is highest among agricultural laborers. The specific work conditions that the medical literature now attributes to the high prevalence of CKD in Central America, are directly comparable to those facing some agricultural workers in California.

This research is the first to use a modern causal empirical design to investigate heat related illness in California's agricultural labor force. This paper will facilitate a discussion of health differentials between rural and urban populations. The paper will promote conversation on potential policy changes that are needed to combat this rural-urban divide, particularly in the face of increasing temperatures. The paper will encourage a discussion of the effectiveness of current labor laws for California's agricultural workforce and of potential improvements to the laws. Finally this paper will present early evidence on the role played by CKD in the long-run health of California's agricultural labor force.

References

Brooks DR, Ramirez-Rubio O, Amador JJ. 2012. CKD in Central America: A Hot Issue. *American Journal of Kidney Diseases* 59(4): 481–484.

Peraza S, Wesseling C, Aragon A, Leiva R, Garcia-Trabanino RA, Torres C, et al. 2012. Decreased Kidney Function Among Agricultural Workers in El Salvador. *American Journal of Kidney Diseases* 59(4): 531–540.

Laws RL, Brooks DR, Amador JJ, Weiner DE, Kaufman JS, Ramirez-Rubio O, et al. 2015. Changes in Kidney Function Among Nicaraguan Sugarcane Workers. *International Journal of Occupational and Environmental Health* 21(3): 241-250.