



統計科學研究所

INSTITUTE OF
STATISTICAL SCIENCE



S.E.M.I.N.A.R.



S.T.A.T.I.S.

Postdoc Seminar

Title : Decreased Burden of Arsenic-Related Cancers
Following Arsenic Mitigation for Drinking Water in
Taiwan

Speaker : Dr. Jing-Rong Jhuang (莊景榮博後學者)
(Institute of Statistical Science, Academia Sinica)

Time : 14:00 ~15:00, Wednesday, October 4, 2023

Place : Auditorium, B1F, Institute of Statistical Science, AS

Abstract

Epidemiological evidence has demonstrated an association between arsenic in drinking water and increased cancer incidence. This population-based study investigates the impact of a tap water supply system installation in Blackfoot disease-endemic regions of Taiwan on cancer incidence. However, it was not until 1995 that the Taiwan Cancer Registry could provide high-quality data. Therefore, the long-term trend in the incidence rates cannot be used to evaluate the effectiveness of Blackfoot disease prevention. In addition, the geographical distribution of arsenic-related incidence rates is also an important issue. This study proposed a spatiotemporal mapping method. First, the random-effects age-period-cohort model is fitted to obtain spatiotemporal parameter estimations in each administration area. Then, these estimations are further interpolated to make predictions on each longitude and latitude. With the procedures, we can draw contour maps of disease rates according to age, period, and cohort and create a movie to show spatiotemporal dynamics vividly. The Monte-Carlo simulation compared interpolation methods, including empirical Bayes, kernel density estimation, kriging, and stabilized kriging. The stabilized kriging performed better among all. Finally, we analyzed arsenic-related cancers from the Taiwan Cancer Registry dataset. The incidence gap between Blackfoot disease-endemic areas and the remaining areas of Taiwan shrunk after the 1958-1962 birth cohort, coinciding with the initial prevention of Blackfoot disease. In addition, spatiotemporal clusters of high incidence rates were identified in southwestern Taiwan, and the clusters also started to dissipate after the 1960 birth cohort. Our method demonstrated appropriate ability and contributed to public health. At the end of the lecture, I will also introduce my future plan to work at the Institute of Statistical Science, Academia Sinica.

Keywords: arsenic-related cancers; incidence rate; random-effects age-period-cohort model; interpolation; spatiotemporal mapping

※ Tea reception starts at 15 : 00.

※ Online live streaming through Cisco Webex will be available.