

Is it Time for Young Survey Statisticians to Shine in the Society?

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Abstract

In survey sampling, policy decisions regarding allocation of resources to subgroups in a population, called small areas, are based on reliable predictors of their underlying parameters. However, in some subgroups, due to small sample sizes relative to the population, the information for reliable estimation is typically not available. Consequently, we need to predict the characteristics of small areas based on the coarser scale data. Mixed models (including cross-sectional, spatial data, and so on) are the primary tools in small area estimation (SAE) and also borrow information from alternative sources (e.g., previous surveys, administrative, and census). In this short paper, I will review my scientific background in this subject with also providing some comments and suggestions for young researchers.

Keywords: small area estimation, spatial statistics

1 Scientific background. Fist of all, this is my honor to write this short paper regarding my Hukum Chandra prize. I was born and raised in Tehran which is the capital city of Iran. In my time, there were three main streams in high school to choose. I chose Mathematics-Physics while other options were Experimental Sciences and Human Sciences. After high school graduation, I participated in the national entrance exam (AKA Konkoor) for a university program. We had 100 options to choose a program and a university after writing the national entrance exam. I was accepted to Statistics program at the National University of Iran (AKA Shahid Beheshti University). Although I chose Statistics, however, I had limited information regarding the program; I should say that I was not accepted to other popular programs in those days such as Engineering (electronic, communication, civil, mechanic). I successfully graduated with BSc and MSc from the National University of Iran before pursing my PhD in Statistics at Carleton University in Canada under supervision of Dr. Jon Rao. In my PhD program, I worked on some interesting problems in small area estimation which resulted in 6 publications in statistics journals. After PhD graduation, I accepted a post-doctoral fellowship (PDF) from University of Alberta, Canada, to investigate the impact of various health research topics in the province of Alberta, Canada. I then joined the Department of Community Health Sciences at the University of Manitoba, Canada, in 2010 as an Assistant Professor of Biostatistics. I am currently Professor of Biostatistics while I hold this position since 2020.

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At the University of Manitoba, I established an excellent research team including my collaborators (methodologists and health clinicians) and also my high quality personnel (MSc, PhD, and post-doctoral). It is evident that my transition from applied statistics to Biostatistics started when I accepted a PDF position at the University of Alberta. As a biostatistician, we have developed various bio/statistics models/methods to answer various questions from the public. The team I lead is developing new models and techniques in the context of population health research to effectively integrate the knowledge we generate into health care practice which is fundamental to the health and wellbeing of the population.

2 Research background. I have developed an original and innovative research program in small area estimation and spatial statistics. In small area estimation (SAE), policy decisions regarding the allocation of resources to subgroups of a population depend on reliable predictors of their underlying parameters. However, in some subgroups, called small areas due to small sample sizes relative to the population, the information needed for reliable prediction is typically not available. Consequently, survey (or administrative) data on a coarser scale is used to predict the characteristics of small areas. Mixed models, which are the primary tools in SAE, are used to borrow information from alternative sources (including survey, administrative, and census) to provide reliable prediction. Such predictions have many applications, e.g. in disease mapping the main objective is to find reliable rates of disease such as cancer in small areas. It also has other applications in agriculture, economics, policymaking, and allocation of funds. The team members I lead have developed novel statistical methods in the context of SAE and applied our innovative approaches to population-health data such as asthma and cancer. In spatial statistics, my program of research is on the development of new and original biostatistics methods for big data over space and time. In population and public health, the identification and measurement of patterns of disease are important goals. These patterns facilitate the understanding of disease and better understanding may lead to the formulation of etiological hypotheses. We may be able to explore the causes of different diseases by identifying the characteristics that increase disease risk (e.g., pollution) and improve disease control. My team members under my direction have developed novel biostatistics methods to better understand big and complex spatial and temporal data. Our innovations have allowed us to better predict spatial and temporal trends of disease, identify corresponding risk factors, and plan for interventions/preventions.

3 Interaction with late Hukum. As explained above, my main research focus has been in SAE and spatial statistics. In particular, my research areas were aligned with late Hukum who was unfortunately died during the covid. I met Hukum in different occasions and in particular in SAE conferences. His personality was unique; he was very kind and a humble person. We discussed few projects from time to time for possible collaborations, but we got busy and could not pursue those ideas. He was a good researcher and made valuable contributions in the context of SAE and spatial statistics. He was attentive in scientific sessions with smile and also open for research discussion. Truly, our SAE community missed him as his character was unique. May his soul rest in peace.

4 Conclusion. As a researcher who has been in academia for more than 10 years, I can attest that the SAE community is growing rapidly as the subject is applicable to many professional organizations and sectors. Many young, energized, and strong researchers are currently working in this important subject, and I can anticipate even more researchers will be involved in this subject area. As it is also evident from the SAE community, senior researchers are mentoring junior researchers, and the future of community is very bright in this direction. Shortly, we will see a transition that young researchers take a full responsibility of the community with support of senior researchers.