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A conversation with Sally C. Morton: excellence in health policy statistics

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Abstract
Sally C. Morton is internationally recognized in the use of statistics in health policy, and has had a career with incredible impact as evidenced by her many leadership roles. She was awarded the ASA Health Policy Statistics Section's (HPSS) Long-Term Excellence Award in January 2018 at the 12th International Conference on Health Policy Statistics. Morton is currently the Dean of the College of Science at Virginia Tech. This article is conversation with Morton about her career.

Courtesy Virginia Tech

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1 Introduction

Sally C. Morton is internationally recognized in the use of statistics in health policy, and has had a career with incredible impact as evidenced by her many leadership roles in statistics, education, research and national policy, including her service as President of the American Statistical Association (ASA) and her promotion of women in statistics. Morton was awarded the ASA Health Policy Statistics Section's (HPSS) **Long-Term Excellence Award** in January 2018 at the 12th International Conference on Health Policy Statistics held in Charleston, South Carolina. The award recognizes Morton for her "*outstanding contributions to the development of statistical methods and innovative statistical applications to health care policy and health services research, for increasing the awareness of health policy statistics in the statistical community, and for significant mentoring and service that advances the aims of the Health Policy Statistics Section*."

Morton is first author or co-author of over 200 journal articles and peer-reviewed reports on health policy and medical topics. Morton's methodological research focuses on evidence synthesis, particularly the aggregation of studies via meta-analysis. Her early work in meta-analysis was principally through the Evidence-based Practice Center (EPC) Program, funded by the Agency for Healthcare Research and Quality (AHRQ). She was the Co-Director of the Southern California EPC, which led to publication of multiple high-profile AHRQ reports and papers in clinical and health services journals examining the impact of clinical practice guidelines, systems of quality indicators, and a wide array of comparative effectiveness studies. She was co-author of the "MOOSE" guidelines for meta-analysis of observational studies. Later, Morton became the Vice Chair of the Institute of Medicine (now the National Academy of Medicine) committee that developed standards for systematic reviews. The committee's recommendations were adopted by the Patient-Centered Outcomes Research Institute (PCORI), as well as by federal funding agencies and the Food and Drug Administration, as guidance for well-conducted systematic reviews. More recently, Morton has served on the Methodology Committee of PCORI that sets widely recognized standards for the proper conduct of clinical studies. In addition, Chapman & Hall recently published *Methods in Comparative Effectiveness Research* that Morton co-edited with fellow biostatistician Constantine Gatsonis of Brown University.

Within the statistics profession, Morton's national and international reputation is corroborated by Morton's selection as an ASA Fellow (2000), Fellow of the American Association for the Advancement of Science (AAAS; 2005), and Elected Member of the International Statistical Institute (ISI; 2014). She also received the 2017 Janet L. Norwood Award for outstanding achievement by a woman in the statistical sciences, the 2015 ASA Founders Award, and the 2013 National Institute of Statistical Sciences Distinguished Service Award. She was the Lowell Reed Invited Lecturer for the American Public Health Association's Applied Public Health Statistics Section in 2015.

Morton is a passionate, first-rate leader. She is Dean of the College of Science at Virginia Tech, where she is also a Professor of Statistics and holds the Lay Nam Chang Dean's Chair. Previously, she was Endowed Chair, Head of the Statistics Group, and Director of the Health Research Methods Program at the RAND Corporation; Vice President for Statistics and Epidemiology at RTI International; and Director of the Comparative Effectiveness Research Center and also Professor and Chair of Biostatistics at the University of Pittsburgh. In 2009, Morton became president of ASA, the leading organization in the U.S. that promotes the profession and practice of statistics. Also, she was the 2013 Chair of Section U (Statistics) of the American Association for the Advancement of Science.

Morton holds a bachelor's degree in mathematical sciences, a master's degree in operations research, and a doctoral degree in statistics, all from Stanford University, as well as a master's degree in statistics from the London School of Economics.

2 Family and schooling

We started off by talking about Morton's childhood and school years. For a time, Morton wanted to be physician, as was her mother Kate. "When I was a little girl, I wanted to be a doctor like my mother," said Morton.

Q1: Where did you grow up?

SCM: "My parents are immigrants from England and I was born in Spokane, Washington. My parents, who are both MDs, were sponsored to be U.S. citizens by a small town in Washington that needed physicians."

Q2: Tell me about your family.

SCM: "I am the third of four children. I have a very heterogeneous family—my older sister is in finance; my older brother is a chef; and my younger brother runs a tree-cutting business. I grew up in a family that encouraged its children to find their passion and follow their dream, and that supported boys and girls equally. I benefited from this encouragement and equity."

Q3: When did you discover your love of mathematics?

SCM: "When I was little, I really liked numbers! When my father came home from work, he would have me count his change so I could tell him how much money he had for the next day. In retrospect, I realized that he was encouraging my love of numbers. In second grade, I had a teacher who identified that I was good at math. I "discovered" the quadratic formula only to realize later that it had been discovered already! As I got into high school, I wanted to do something different from my parents, and enjoyed mathematics as a way to solve problems. I benefited from having an accomplished mother who was the first woman in many roles in her career, and a father who was very supportive. I think this helped me—for example, I was the only girl in calculus and physics classes in high school. I feel that I was very fortunate. Young people, especially women, who do not have strong role models are disadvantaged."

Q4: When and why did you decide on attending Stanford and majoring in the mathematical sciences?

SCM: "I decided to go to Stanford based on distant pleasant memories of California from childhood as we lived there when I was about 5–10 years-old, as well as a fortuitous scholarship. When I got to Stanford, I had to declare a major quite quickly because I had credits from high school classes. One afternoon, I perused the Courses and Degrees book, and I wrote down all majors that I thought I could potentially undertake. The final list only had three entries for consideration: classics, electrical engineering, and mathematical sciences. Mathematical sciences, now the major is called computational and mathematical science, was divided across four departments (Computer Science, Mathematics, Operations Research, and Statistics). I knew the major had variety and I would never get bored. So, I elected to major in mathematical sciences at Stanford. In addition to my bachelor's degree, I ended up getting a master's in operations research as well."

Q5: How did you get into Statistics?

SCM: "My career in statistics started by pure chance. To be honest, I didn't even know what a statistician was. One of my first statistics classes was on stochastic processes with famed survival analysis professor Rupert Miller at Stanford, and I was inspired. Professor Miller was one of those professors you wanted to do your best for. We were looking at problems I thought were important; I saw how statistics could be used. Then in 1983, I was literally sitting under a tree with Persi Diaconis and Brad Efron, and they suggested that I should pursue a master's degree in Statistics. I wanted to go abroad and London seemed a natural setting."

A child of British parents who felt at home in London, Morton chose the London School of Economics to pursue an MSc in Statistics.

Q6: Who were your big influences during graduate school at Stanford?

SCM: "With master's degree in hand, I returned to Stanford to earn a Ph.D. in statistics. I was fortunate to work with several people who influenced my thinking and had a major impact on my career. The first was Joe Oliger, who was a computer science professor with a focus on numerical analysis. As an undergraduate, I was in one of Professor Oliger's classes and he hired me to do wave propagation programming in FORTRAN. I had to work my way through college. Joe ended up on my PhD thesis committee, and remained an important mentor and friend throughout graduate school. I met Brad Efron as a freshman as he was the director of the Mathematical Sciences major. He provided the connection and reference that got me to RAND, and encouraged me to start my career outside of academe. Of course, my thesis advisor Jerry Friedman was also very instrumental in my career. Jerry is trained as a physicist and is not constrained by statistical paradigms. He's a big ideas guy and a very innovative thinker.

3 Statistics and public policy

Morton desired a career with the potential for impact on people's lives, motivated by the effect her parents had in their medical careers. As a statistician doing health policy, she remembers explaining sampling weights for the national HIV Cost and Services Utilization Study that examined cost and access to HIV care to the U.S. Surgeon General. "That was the type of impact I always wanted to have—to use statistics to make a difference," Morton said.

Q7: What led to your first job at RAND?

SCM: "One of the textbooks in an introductory operations research class I took as a freshman was titled *Models in the Policy Process*. The book mentioned the RAND Corporation, a public policy "think tank." I thought it would be a very cool place to work. David Draper of RAND came to give a talk at Stanford during my third year of graduate school. I met David the morning of his talk and said how fascinating RAND sounded. He said if I was interested in applying for a summer internship, I should bring him my CV at 3 pm that afternoon. I didn't have a CV, so I rushed home on my bike, typed up a CV on my typewriter, and rushed back to the department at 3 pm. John Rolph, then the head of the RAND Statistics Group, brought me on as a summer intern—and in 1989, hired me as the first female statistician at RAND. I subsequently became head of the RAND Statistics Group from 1995 to 2002. I really enjoyed working at RAND—I always felt close to significant policy problems."

Q8: What were some of the major studies you conducted at RAND?

SCM: "The most interesting project I worked on at RAND involved evaluating the benefits and risks associated with ephedra, which is an herbal supplement usually used in the United States for weight loss or athletic performance—you can read about it in an article we published in *Statistical Science* in 2005. We conducted a systematic review of the evidence, including an analysis of serious adverse events such as heart attacks and deaths contained in the U.S. Food and Drug Administration MedWatch database. This project was statistically complex, and it also presented a challenge in terms of communication, given the implication that ephedra had caused the deaths of high-profile athletes. Health and Human Services Secretary Tommy Thompson was quoted as saying, "I would not take this [ephedra]; I would not give it to my family. And I don't know why anyone would take these products." Suffice to say, there was considerable media attention on our analysis. One lesson I learned was to anticipate the political and publicity spin a project might produce.

Another high-profile study I worked on examined racial discrimination in the application of the death penalty. This study influenced the national conversation surrounding the racial bias in death penalty sentencing. Particularly in this time of big data, evidence-based policy requires big statistics. By big statistics, I mean statisticians need to be involved early in the process of design and data collection; communicate with other scientists, policymakers, and journalists; and acknowledge politics as part of the mix."

Q9: What were your accomplishments as the first female Head of RAND's Statistics Group?

SCM: "Leading the RAND Statistics Group, I worked to increase its base of women and underrepresented employees, and I've tried to do similarly in my subsequent leadership positions. Achieving a diversity of people and viewpoints is fundamentally important to good science. I've worked with many interdisciplinary teams, and what I've learned is you really want people that think differently from the way you think. That's what the transdisciplinary sciences are all about."

4 Leadership in statistics

Morton is the second woman trailblazer in her family. Her mother Dr. Kate Morton was the first woman to serve in the Johns Hopkins University School of Medicine dean's office during the early 1970s. In 1978, Kate was named president of New York Medical College.

Q10: From RAND, you moved to RTI International to become Vice President for Statistics and Epidemiology. Describe your time at RTI.

SCM: "I went to RTI to have the experience of leading a larger group than I had at RAND. We merged two groups to form a department of about 270 staff. RTI has a strong scientific and statistical community, particularly with respect to survey statistics. I learned an incredible amount about leadership and administration, lessons that I use every day now as a dean."

Q11: What prompted your next move to the University of Pittsburgh?

SCM: "I always liked engaging with early-career statisticians and I decided that working directly with students in an educational setting would be ideal. I saw the advertisement for the Chair of Pitt Biostatistics in *Amstat News* and decided to apply, despite not being an academic. I could use my leadership skills and biostatistical experience to land the position. It was a perfect fit—a solid department with great people and room to grow. I really enjoyed my time at Pitt."

Q12: Why did you choose next to become Dean of a College of Science?

SCM: "I had been looking around at Dean positions for a little while when the Virginia Tech College of Science position came up. Honestly, I initially didn't even know what a College of Science was—a friend told me about the position. I knew the national reputation of Virginia Tech and its Statistics Department. The College was clearly very strong and poised to move to the next level. As with all new positions, there were components of the job that I didn't have any experience with—undergraduate education for one: We have about 5000 students in the college and we teach close to 100% of all 27,000 undergraduates at Virginia Tech. My attitude is just to be open to learning, and understand that one does not do a job by oneself. Across my career I've just tried new things, which has resulted in an eclectic and interesting path."

Q13: What drew you to Virginia Tech?

SCM: "I was drawn to the College's innovative approaches such as the new Academy of Integrated Science and its Computational Modeling and Data Analytics program. I was also drawn by the strength and momentum of the university. I thought this was a time of change, a time of challenge, and a place to learn. I always go to places where I think I can learn things, to places where I would be proud to work. I hope to impact not just the College, but the university at large, in part by educating all students on the use of data as a tool. At the university level, I'm pushing the concept of data literacy, the idea that all students need to leave the university with the ability to look at evidence and data, whether qualitative or quantitative, both as professionals and in their personal lives. Our students should be able to access data, analyze data, and use data to make good decisions."

Q14: In 2009, you were elected to be President of the American Statistical Association (ASA). What was it like to be president?

SCM: "Being President of ASA was a game changer for me. I learned a tremendous amount about the organization and the discipline. Over the past 10–15 years, the ASA has become more nationally and globally active with respect to policy and I was fortunate to be president during this period (2009). Being ASA president was the professional honor of a lifetime."

5 Comparative effectiveness and health policy

Morton has championed the use of evidenced-based medicine before it was fashionable and can justifiably claim to have helped lay the foundations of current practice in this area. While at University of Pittsburgh, she was the director of the Comparative Effectiveness Research Center in the University's Health Policy Institute. She recently published the book *Methods in Comparative Effectiveness Research*, which she co-edited with fellow biostatistician Constantine Gatsonis of Brown University. With Dr. Gatsonis, she was a member of the Institute of Medicine (now the National Academy of Medicine) committee that identified the initial national priorities for comparative effectiveness research, and she served on its precursor committee "Knowing What Works in Health Care." She has also served on a significant number of National Academy of Sciences committees and panels, including the following: Committee on National Statistics; Steering Committee on Enhancing Research and Development for the Federal Statistical System: A Workshop; and the Committee on Estimates of Poverty for Small Geographic Areas.

Q15: How did you enter the field of Comparative Effectiveness Research? Tell me more about your contributions.

SCM: "I was Co-Director of the Agency for Healthcare Research and Quality (AHRQ) Southern California Evidence-based Practice Center (EPC) at RAND, which was established in 1997 when the EPC program began. EPCs conduct systematic reviews and meta-analyses, and do research on related methodology. Healthcare reform targeted funding for patient-centered comparative effectiveness research (CER), which focuses attention on including patients and their families in evidence-based medicine. Evidence synthesis is a cornerstone of CER. The Patient-Centered Outcomes Research Institute (PCORI) was established in the reform legislation, and PCORI has identified sound methodology as an imperative in CER. Specific funding is targeted for methodological research, which is a real boost for statisticians working in health services research."

Q16: I'd like to talk more about your extended involvement with health policy statistics including contributions while serving on committees/panels. What types of issues have you addressed on these committees?

SCM: "The topics of these committees that I have served on have all concerned health policy, and I was fortunate to be asked to participate due to my experience in evidence synthesis, particularly the science of systematic reviews and meta-analysis. My first Institute of Medicine (the National Academy of Medicine) committee focused on how to identify highly effective clinical health care services and led into a second committee, which identified initial national priorities for comparative effectiveness research. Both committee reports informed the healthcare reform debate. Subsequently, I was Vice Chair of a committee that established methodological standards for systematic reviews and then served as a member of a committee examining geographic variation in health care spending.

I just finished service on a committee considering the process for updating the national dietary guidelines, including how the guidelines advisory group is selected and how systematic reviews are conducted. I enjoy contributing in this way—I always learn a tremendous amount and feel I can have an impact as a statistician. While I have never served on the Executive Committee of the Section on Health Policy Statistics (ASA), I have tried to be a good representative for the Health Policy Statistics community."

6 Conclusion

Q17: What would you like to say in conclusion?

SCM: "The motto of Virginia Tech is *Ut Prosim,* "That I May Serve," and I have tried to live my career in service to others. As Dean, I endeavor to model that behavior for our students, faculty and staff."

In summary, Morton's career highlights that impact happens not just by writing well-cited papers or collaborating on excellent science but also by ensuring that standards are high, that they involve sound statistics and that the role we statisticians play is recognized. There is no more effective way to have impact than to have a seat at the table where decisions are being made. Morton's role on national committees, expertise in statistical methods, commitment to writing influential reports, and providing methods for important applications and her representation of the statistical profession to the larger scientific

community—all of these impressive contributions make her uniquely deserving of the HPSS' **Long-Term Excellence award**. Congratulations Sally!

Compliance with ethical standards

Conflict of interest Author declares that she has no conflict of interest.

Ethical approval This article does not contain any studies with human participants performed by any of the authors.