Interview With George Kaplan—One Of Four Co-Editors Of A New Book on Complex Systems Approaches To Problems In Population Health

We learned recently about the publication of “Growing Inequality — Bridging Complex Systems, Population Health, and Health Disparities” co-edited by George Kaplan, Ana Diez-Roux, Carl Simon, and Sandro Galea. We read very positive reviews about the book and invited the University of Michigan’s George Kaplan to answer a few short questions to help readers better understand how the book came to be and its significance for epidemiologists. Below is the interview.

EM: Creating the network you describe was unique. What were some of the rewards for you as a

- Kaplan continues on page 2

Large NIH-AARP Diet and Health Study Finds Red Meat And Associated Compounds Increase Risk Of Death From Multiple Causes

The evidence keeps accumulating to indicate the consumption of red meat is associated with a higher risk of death. In the latest study from NIH published in the British Medical Journal on May 9, NIH epidemiologist Arash Etemadi and colleagues found that persons in the highest quintile of red meat consumption had a 26% increased risk of all cause mortality compared with the lowest quintile. Cause specific deaths were higher for nine major causes of death. Both processed and unprocessed red meat were implicated whereas white meat consumption was associated with a lower risk of all cause mortality.

The population based cohort study was impressive for its large size with over half a million participants and a 16 year follow up.

Writing in a conclusion to their paper, the authors note “This is the largest study, so far, to show increased mortality risks from different causes associated with consuming both

- NIH-AARP cont’d on next page

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processed and unprocessed red meat, and it underlines the importance of heme iron, nitrates, and nitrites in assessing the pathways related to health risks associated with red meat intake. Our findings also show reduced risks associated with substituting white meat (poultry and fish) particularly unprocessed white meat.”

In a notable awareness-raising commentary, Massey University epidemiologist John Potter told BMJ readers that red and processed meats are likely to be harmful to human health in many different ways and simply focusing on one or two of these outcomes in not helpful in creating prevention strategies. According to Potter, “It feels like an old fashioned murder mystery with too many suspects. The important conclusion is that the current patterns of consumption of red and processed meat are not good for humans.”

He lays out why overconsumption of meat is bad for the planet as well, and cites the late Australian epidemiologist Tony McMichael to indicate that “research even provides clear underpinnings for evidence based policy that could limit harm to both [health and the planet] but these underpinnings are not linked to action.” According to the BMJ editor, the latest report confronts doctors and society with “another inconvenient truth” and suggests that the health profession could lead by example as it did with smoking cessation.

Kaplan: Over many years – really many decades – I became more and more convinced that we as epidemiologists needed to broaden our perspectives in order to understand and improve population health for all. While the search for independent causes – the often elusive magic bullets – had worked in some cases, many of the problems that we were interested in were more characterized by tangled webs of factors where the search for a single cause was not realistic and often led to definitions of problems that bore little resemblance to the real world.

Being able to bring researchers who had experience simulating complex systems together with those who knew something about the biological, behavioral, social, spatial, and institutional factors that produce disease outcomes in individuals and populations was a rare opportunity to push the envelope, to move from Occam’s quest for simplicity towards Einstein’s dictum that “everything should be made as simple as possible, but not simpler.”

My colleagues and I, assembled into the Network on Inequality, Complexity and Health, (NICH) hoped to demonstrate the feasibility of embracing the complexity of disease causation, rather than trying to eliminate it or control for it. That in itself would have been reward enough, but the response we got from other colleagues, particularly...
those in early stages of their careers, indicating a thirst to learn more about these approaches was the icing on the cake.

**EM:** Did the interdisciplinary benefits that were anticipated or imagined really come to pass? What were some of the challenges in working as a network or through this network process?

**Kaplan:** All together we involved around 50 colleagues in this journey, with 18 coalescing into the membership of NICH and meeting for almost five years. It was a very diverse group, representing perhaps well more than a dozen disciplines (epidemiology, neurosciences, computer science, economics, political science, public policy, mathematics, communications, nutrition, law, education, medicine, psychology, child development, etc.).

While such a diverse group brings great strength, it does bring with it certain challenges. Many of the people from the health and social sciences had no or little previous experience with complex systems modeling, and several of the complex systems modelers in the network had little or no experience working on health disparities or population health topics. Thus, there was a continual process of providing background information in all three areas, and of learning from each other. While valuable, this was an iterative process that was time consuming but essential. While not fundamentally different from my experience in other interdisciplinary groups, there was the added challenge of becoming comfortable with the logic, process of developing, and understanding of the results of complex systems simulations.

In individual interviews with each NICH members, there was great enthusiasm for the network process. Typical were statements like,

“...[the diversity of the network] allowed me to see and work on connections that I wouldn’t have worked on otherwise,”

“...exposure to new ideas was great, excellent people,”

“...has dramatically expanded the scope and reach of what I do...invaluable colleagues,”

“I have moved to a serious commitment to modeling health disparities and population health,”

“...increase[ed] my interest in life course issues,”

“...have added serious discussion of social determinants of health and health disparities issues to my teaching of non-public health students,”

“....changes the way that I look at things...enlarged my vision,”

No member indicated in any way that they would have preferred less diversity in backgrounds and methods, and most commented on the benefits of such diversity to their thinking.

Finally, I would say that over time the network members better understood and became more comfortable with the use of in-silico/virtual/simulated worlds in which to examine counterfactuals that certainly were not amenable to test in other ways.

**EM:** Can you give a couple of examples of payoffs from the network

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"...has dramatically expanded the scope and reach of what I do...invaluable colleagues,"

"No member indicated in any way that they would have preferred less diversity..."
process and payoffs regarding any of the specific topics investigated?

Kaplan: The biggest payoffs were probably those that had to do with our ability to stimulate network members and others into using complex systems approaches in epidemiology and public health, and to legitimize such efforts. There was dramatic increase in courses and programs centered on using complex systems analytic approaches in a number of departments and schools, and we attracted over 800 registrants, from 39 states and 19 countries, to a symposium at the NIH Natcher Center that was centered around NICH and its approach.

It also became clear that while there is the potential for considerable payoff, there are considerable educational, training, and resource needs in order to pursue the use of complex systems methods in epidemiology and other areas of public health.

There were any interesting findings, with some mentioned below. They are initial forays – much work needs to be done. In fact, a rather small part of the funding for NICH supported these efforts. They are more proof of concept than finished work, as the purpose of the network was to demonstrate innovative approaches not to generate complete bodies of work. You will note that most of the approaches are considerably ‘upstream’ of most epidemiologic studies. That reflected both the composition of the NICH group, as well as a rapidly evolved consensus that complex systems approaches could be useful for approaching such ‘tangled’ problems.

a) Orr et al. found that policies that modified the neighborhood educational, physical activity, and nutritional environment were found to dramatically reduce Black/White BMI disparities. But the effects took considerable time, and each policy had a different time course.
b) Stange et al. found that access to primary care actually increased the effects of specialty care in treating specific diseases.
c) Yang et al. found that for low SES populations, changing attitudes about walking was not sufficient to change behavior unless the environments were changed as well.
d) Kreuger et al. showed that the factors that affect preventive dental care utilization differ according to SES – cost and access were the predominant factors for low SES patients, while issues of trust impacted more on high SES patients.
e) Kassman and Klasik simulated the factors driving disparities in college enrollment and found that affirmative action based on SES was not as effective as race-based affirmative action in reducing disparities in enrollment.
f) Simon et al. modeled the dynamics of the spread of crime and mass incarceration, and developed a kind of “flight simulator” that allowed them to examine differential effects of policies related to incarceration rates, recidivism etc.
g) Wolfson and Beall, created a detailed simulation to help understand the different associations between income inequality and health in the US and Canada, and were able to assess...
National Academies Report Makes Strong Case For US Involvement In Global Health

Calling on the new Trump administration to extend the proud legacy of US involvement and achievement in global public health, a panel from the National Academies has identified four priority areas and made 14 recommendations to guide the future role of the United States in global health.

Why Global Health and Why Now? Before presenting its recommendations, the NAS report seeks to make the case for why supporting global health initiatives is important to the United States. Several rationales are offered by the committee in the statement released by the NAS.

- The increased interdependency of countries, economies, and cultures resulting from tremendous growth in international travel and trade over the last several decades has brought improved access to goods and services, but also a variety of health threats...

- By investing in global health over the next 20 years, there is a chance to save the lives of millions of children and adults...

- The health and well-being of other countries both directly and indirectly affect the health, safety, and economic security of Americans.

- The U.S. government should maintain its leadership position in global health as a matter of urgent national interest and as a global public benefit that enhances America’s international standing.

The four priority areas containing 14 specific and cross-cutting recommendations included in the NAS statement and report are listed below:

I. Achieve global health security

In the last 10 years, outbreaks of potentially pandemic influenza, Middle East respiratory syndrome coronavirus (MERS-CoV), Ebola, and most recently Zika have threatened populations around the world. In each case, global and national responses, including those of the United States, have been reactionary, uncoordinated, ineffective, and highly costly. Absent the establishment of fundamental public health protections and preparedness capabilities at home and abroad, the world will never be ready to prevent, detect, and respond to such outbreaks. A solid commitment in the form of a sustainable mechanism for addressing these global threats is a critical need. The committee urges the administration to create a coordinating body within the U.S. government with the authority and budget to develop a proactive, cost-effective, and comprehensive approach to preparedness for and response to international public health emergencies.

Recommendation 1: Improve international emergency response coordination.

Recommendation 2: Combat antimicrobial resistance.

Recommendation 3: Build public health capacity in low- and middle-

"...there is a chance to save the lives of millions of children and adults..."

"...global and national responses, including those of the United States, have been reactionary, uncoordinated, ineffective, and highly costly."
income countries.

Included on the NAS panel were at least two epidemiologists, the University of Minnesota’s Michael Osterholm and Duke University’s Michael Merson who have both had a career focus on global health issues and threats. In an op-ed essay in the New York Times last March, Osterholm and a colleague stated “While the Trump administration is proposing significantly increased military spending to enhance our national security, it seems to have lost sight of the greatest national security threat of all: our fight against infectious disease. We already spend far more on our military than any other country in the world. To help pay for the increases, President Trump wants to cut back many federal programs, including those that prepare us to wage war against microbes, the greatest and most lethal enemy we are ever likely to face. This is where ‘defense spending’ needs to increase, significantly.”

II. Maintain a sustained response to the continuous threats of communicable diseases

Dedicated efforts of national governments, foundations, and the global community have resulted in millions of lives saved from AIDS, tuberculosis (TB), and malaria, yet all three diseases continue to pose immediate and longer-term threats to the health of populations around the world. More than 36 million people are living with HIV, with 2 million new infections occurring each year. TB disproportionately affects the poorest populations of the world, killing 1.4 million each year, while dangerous resistant strains are becoming more prevalent and easily spread. The mortality rate due to malaria has decreased by more than 60 percent in the last 10 years, but those infected can lose 25 percent of their family’s income as a result of their lost productivity, affecting the prosperity of the society at large as well.

Recommendation 4: Envision the next generation of the President’s Emergency Plan for AIDS Relief.

Recommendation 5: Confront the threat of tuberculosis.

Recommendation 6: Sustain progress toward malaria elimination.

III. Save and improve the lives of children

Although child and maternal mortality rates have decreased since 2000, each year nearly 6 million children die before their fifth birthday, and more than 300,000 women die from pregnancy- and childbirth-related causes. The vast majority of these deaths are preventable. The committee urges the U.S. government to continue its commitment to this survival agenda but also expand it to incorporate early childhood development as a key element.

Recommendation 7: Improve survival in women and children.

Recommendation 8: Ensure healthy and productive lives for women and children.

IV. Promote cardiovascular health and prevent cancer.

Infectious diseases often captivate the media, but an equally important concern is rising rates of NCDs, such as cardiovascular disease (CVD) and
Rochester Epidemiology Project Data Now Available To Researchers Free Of Charge Through New Data Sharing Tool

The Rochester Epidemiology Project (REP) which has prevalence data on the health of the Olmstead County Minnesota population going back more than 50 years is making this information available free of charge to researchers, public health officials, and the public. According to Walter Rocca, co-director of The Rochester Epidemiology Project, this new tool, called the Data Exploration Portal, “…provides a new way to examine the occurrence of diseases and facilitate prevention in our community...We are excited to be able to share some of the data and to see what other insights it will bring to community health and wellness.”

According to a press statement, the Data Exploration Portal will allow investigators to accomplish multiple purposes. These include:

1) Compare the prevalence of different conditions to determine if there is something of interest to investigate
2) Explore age and sex-specific information
3) Identify geographic clusters
4) Test hypotheses
5) Narrow the focus of public health agencies to the conditions most relevant to their communities
6) Allow providers to identify potential patient needs and better personalize care.
7) Allow patients to better educate themselves about their disease

To learn more about the REP and the data portal, visit:

https://tinyurl.com/y9ahf5jk

“…provides a new way to examine the occurrence of diseases and facilitate prevention in our community...”

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cancer, in countries around the world, regardless of income level. The costs of managing these diseases are rising as well. CVD alone is projected to cost the world $1 trillion annually in treatment costs and productivity losses by 2030. However, because of their historical focus on infectious diseases, many health systems in low- and middle-income countries are not adequately equipped to care for patients with NCDs. The need to fill these gaps often goes unmet because of other priorities, but their prevention and treatment can be built into existing platforms for other areas, such as HIV/AIDS or maternal and child health.

Recommendation 9: Promote cardiovascular health and prevent cancer

Cross-cutting topic areas
To have the greatest effect in the above priority areas, the committee identified three cross-cutting areas for action to maximize the returns on investments, achieve better health outcomes, and use funding more effectively:

Recommendation 10: Accelerate the development of medical products.

Recommendation 11: Improve digital health infrastructure.

Recommendation 12: Transition investments toward global public goods.

Recommendation 13: Optimize resources through smart financing.

Recommendation 14: Commit to continued global health leadership

To obtain a copy of the NAS report, visit: https://tinyurl.com/ybuujxcp

"CVD alone is projected to cost the world $1 trillion annually in treatment costs and productivity losses by 2030."

"... the different patterns in the US and Canada are more related to differences in intergenerational socioeconomic mobility than to neighborhood level factors."

...Kaplan continued from page 4

the role of neighborhood racial and income segregation. Their initial results suggest that the different patterns in the US and Canada are more related to differences in intergenerational socioeconomic mobility than to neighborhood level factors.

h) Kumanyika et al. simulated various factors that might account for differences in levels of physical activity between Black men and women. They found an important role for the supportive behavior of others in explaining the relatively lower levels of leisure-time activity in Black women.

i) Boyce et al., found an important role for classroom structure and teacher behavior in the mental health consequences of classroom hierarchy.

Book information:
https://tinyurl.com/ybs65zde

Sample chapter and TOC:
https://tinyurl.com/y9usrh1r
Checklist Intervention Program Decreases Post-Surgical Mortality Rates In South Carolina Hospitals

An interesting paper in the Annals of Surgery has reported that South Carolina hospitals voluntarily adopting a checklist based surgical quality improvement program were able to reduce post-operative mortality by 22% when compared to other hospitals in the state not participating in the program. The 30 day post-operative mortality rates were risk-adjusted and decreased from 3.4% in 2010 to 2.8% in 2013 in participating hospitals compared to 3.5% in 2010 and 3.7% in 2013 in non-participating hospitals. The authors report that similar results have been achieved by relatively small teams of surgeons but implementation on a wider scale has been limited. This study demonstrates that the checklist program may be feasible to implement on a larger scale.

Life Expectancy Found To Vary By More Than 20 Years Depending On Where You Live

Differences in county-level life expectancy are large and increasing, according to a new report in JAMA Internal Medicine.

Investigators looked at life expectancy from 1980 to 2014 and found life expectancy to be 79.1 years overall with the rates differing by 20.1 years between the counties with the highest and lowest life expectancy. The gap between the highest and lowest counties increased over this time period, however, but it became smaller for children and larger for adults. Socioeconomic and race/ethnicity factors, behavioral and metabolic risk factors, and health care factors each explained 60%, 74%, and 27% of county level variation, respectively.

Lead author Laura Dwyer-Lindgren told Science Daily “Looking at life expectancy on a national level masks the massive differences that exist at the local level, especially in a country as diverse as the United States...Risk factors like obesity, lack of exercise, high blood pressure, and smoking explain a large portion of the variation in lifespans, but so do socioeconomic factors like race, education, and income.

The top ten counties with the largest increases in life expectancy were spread across the US from Alaska to Florida to California, however, the counties with the top ten largest decreases in life expectancy were all in the south and 8 out of 10 were in Kentucky.

Adult Vaccination Levels Against Multiple Diseases Remain Low In The US

The vaccination program in the United States has succeeded in achieving high vaccination coverage levels in children and thereby making the prevalence of vaccine preventable diseases lower in children than adults.

- Briefs continues on page 10
According to CDC, “despite longstanding recommendations for use of many vaccines, vaccination coverage among US adults is low. Just how low can be seen in the table below which gives coverage rates for the various recommended vaccines.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Coverage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza (adults ≥ 19 yrs)</td>
<td>44.8%</td>
</tr>
<tr>
<td>Pneumococcal (for persons at increased risk adults, 19-64 yrs)</td>
<td>23%</td>
</tr>
<tr>
<td>Tetanus (in the past 10 years / adults ≥ 19 yrs)</td>
<td>61.6%</td>
</tr>
<tr>
<td>Tetanus, diphtheria, and pertussis (among persons who could be assessed adults ≥ 19 yrs)</td>
<td>23.1%</td>
</tr>
<tr>
<td>Hepatitis A (2 doses or more / adults ≥ 19 yrs)</td>
<td>9%</td>
</tr>
<tr>
<td>Hepatitis B (3 doses or more / adults ≥ 19 yrs)</td>
<td>24.6%</td>
</tr>
<tr>
<td>Herpes Zoster (adults ≥ 60 yrs)</td>
<td>30.6%</td>
</tr>
<tr>
<td>Human Papilloma (women 19-26, at least one dose)</td>
<td>41.6%</td>
</tr>
</tbody>
</table>

To raise coverage levels, CDC points to the need to improve education and awareness about vaccines, to increase access to vaccines in existing heath care settings, and to use best practices for achieving higher coverage such as reminder-recall systems, assessment and feedback on coverage levels to providers, and other evidence based interventions.

To view the full results, visit:

https://tinyurl.com/y79d5kkl

New Method Said To Improve Outbreak Control

“The difference between the projections and the actual size of the 2014 Ebola outbreak caused intense public debate. But rather than focusing on how big the outbreak would be, our study focused on what to do to keep it small.” That is how Shou-Li Li, principal author of a recent report in the Proceedings of the National Academy of Sciences characterized the focus of his study using a method from economics and wildlife management called “value of information” analysis. With that technique they reviewed 37 models of Ebola outbreak dynamics and found that these models consistently rated reducing transmission rates at public funerals and in the community as the two most important control strategies. According to Shou-Li, the method helps identify “…the best course of action, given what we know now, and highlights the gaps in our knowledge that actually matter to the selection of intervention strategies.” The method potentially can be used in real time with fast-moving disease threats in other non-Ebola situations to make decisions with imperfect or incomplete information. The authors were able to estimate that the use of their method could have created a reduction of 3266 cases and saved 1633 lives.
Notes on People

**Honored:** Carol Hogue, epidemiologist and Jules and Uldeen Terry Chair in Maternal and Child Health at the Rollins School of Public Health at Emory University with the 2017 Thomas Jefferson award given to recognize personal and professional integrity as well as distinguished service in teaching, research and scholarship, non-academic accomplishments related to students, university advancement and development, and community or educational service.

**Honored:** Lisa Berkman, Thomas D. Cabot Professor of Public Policy, Epidemiology, and Global Health and Population, and director of the Harvard Center for Population and Development Studies with the Mentoring Award from the Committee on the Advancement of Women Faculty at the Harvard Chan School of Public Health. The award is given to celebrate the essential role of mentors in the success of Harvard Chan school faculty members and the growth of the School community.

**Commencement Speaker:** Michael Marmot, at the University of Miami on May 10, 2017. He told the graduates, “I invite you, join me in my fantasy land, and let’s dream of a fairer world.” Marmot was referring to criticisms he has received for seeking a fairer distribution of power, money, and resources to help address the social determinants of health. Read his commencement address here: [https://tinyurl.com/ycrb34f](https://tinyurl.com/ycrb34f)

**Honored:** Claes Tingvall, Swedish epidemiologist, with an honorary doctorate degree from Emory University. At the Swedish Transport Administration, he had a leading role in developing the policy of Vision Zero, i.e., a road transport system free of death and serious injury resulting from road crashes.

**Retired:** Richard Hopkins, University of Florida epidemiologist, on May 1, 2017. Prior to his appointment at the University of Florida, Hopkins served as state epidemiologist in both Colorado and in Florida. He is an alumnus of CDC’s Epidemic Intelligence Service.
**Elected:** Chandra Mani Pandey, as the 21st President of the International Epidemiological Association. Professor Pandey is head of the Department of Biostatistics and Health Informatics, Post Graduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India and is a noted biostatistician and public health expert.

**Honored:** Danya Keene, assistant professor in the Yale University Department of Chronic Disease Epidemiology, with the 2017 Distinguished Student Mentor award by the graduating class at the Yale School of Public Health. She was selected for her individualized attention, support, and encouragement and being an exemplar of excellence to her students and advisees.

**Honored:** David Felson, professor of epidemiology and medicine at Boston University, with the Carol Nachman Prize for Rheumatology. The prize is the most prestigious international award for research in rheumatology. His research has focused on how to prevent and treat osteoarthritis.

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