10-2014

Improving Public Health Safety Nets after an Economic Recession

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Policy Brief

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No. 50/2014

Dr. Sanjay Basu is an Assistant Professor of Medicine at the Stanford Prevention Research Center. He received his undergraduate degree from MIT, completed a Rhodes Scholarship at Oxford, and received his MD and PhD in epidemiology at Yale. Dr. Basu's research interests focus on global development and human health, and include the use of econometrics and simulation models to study how socioeconomic changes and social policy interventions affect primary disease risk among low-income populations. His current work includes studies on the health effects of economic shocks, global changes in chronic disease risk, and approaches to studying public health interventions using systems science methods. Additionally, Dr. Basu is co-author of *The Body Economic: Why Austerity Kills*. This book offers unique insight into how economic recessions in many countries have led to deteriorating public health systems when leaders focus exclusively on improving financial markets and balancing budgets.

The Herbert Lourie Memorial Lecture on Health Policy, sponsored by the Maxwell School of Citizenship and Public Affairs of Syracuse University and the Central New York Community Foundation, Inc., honors the memory of Herbert Lourie, MD, a distinguished Syracuse neurosurgeon, professor, and community leader for nearly 30 years. Generous contributions from his family, friends and colleagues, and former patients have endowed this series.

The Policy Brief series is a collection of essays on current public policy issues in aging; urban and regional studies; education finance and accountability; public finance; social welfare, poverty, and income security; and related research done by or on behalf of the Center for Policy Research (CPR) at the Maxwell School of Syracuse University.

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The subject that I'm going to talk about is what I would argue is one of the most important public health questions in our modern time, and yet, surprisingly one of the most understudied. To present the question to you, I'm first going to start with a bit of a puzzle.

Putting on my hat as a primary care physician, I had assumed, perhaps naively, that when the recession started in 2007, its effects on health would be obvious. I had patients who became depressed, lost their jobs, and turned to alcohol. Many of them stopped paying their copays for prescription medications, so that they could afford to pay rent. So I assumed the impacts of recession on health would be obviously negative, so obvious as to be boring, and not worth studying.

But then a colleague pointed out a USA Today article that he had found on his hotel doorstep: the headline was "Recession is good for you?". (USA Today 2003) The headline seemed counter-intuitive. But when I looked at the public health, economic, and sociology academic literature, I found that indeed this finding had been published a number of times: during periods of recession, for some reason, life expectancy increases and death rates decrease. (Ruhm 2005; Bezruchka 2009)

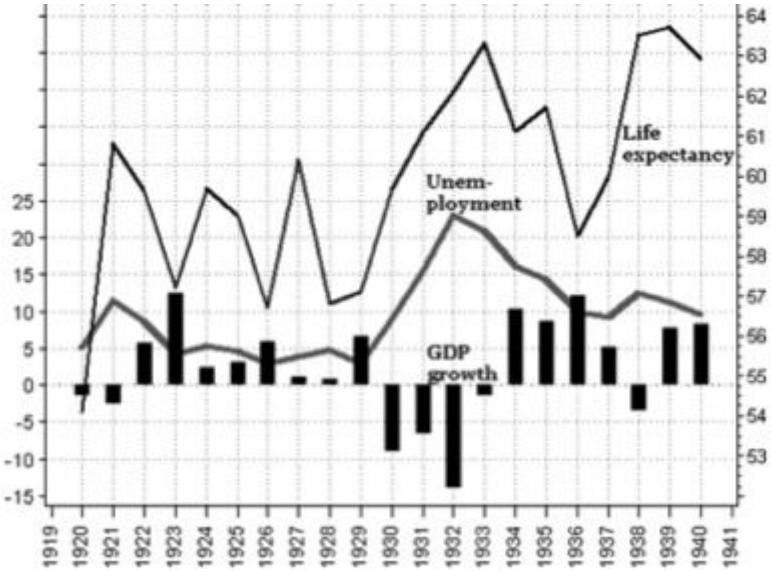
I found this very strange.

By pursuing an answer to this puzzle, I found a few other insights that I think are even more important questions than what on earth is going on to explain this correlation between recession and increased life expectancy. The central questions I want to focus on is: when we say 'here's what's going on with our nation's health,' how do we know the answer? Where is the data coming from? How can we best evaluate our public health system? We're talking about it every day on CNN given the Ebola scare. What do we mean by our 'public health system'?

I would argue that we should expand our definition to mean something more than hospitals and clinics, or doctors and nurses. In particular, I'll argue that some of our non-health programs that we have as part of the safety net actually make a bigger health impact than some of our public health programs. In trying to pursue the answer to the question of why this is the case can lend us some pretty important insights.

I'll focus on three big areas, because I think they're the three biggest areas in our nation's discourse on the recession: issues around income; issues around food; and issues around housing, particularly in the context of the foreclosure crisis.

So let me get back to the puzzle for a moment. That puzzle was based on a number of correlations similar to the graph below from the University of Michigan. (Granados and Roux 2009; Stuckler 2012) On the right axis, we have life expectancy jumping up and down. On the left axis, generally going up at the same time is unemployment. Gross domestic product (GDP) growth is also plotted, going down during the period of unemployment and recession.



Life and death during the Great Depression. (Granados and Roux 2009)

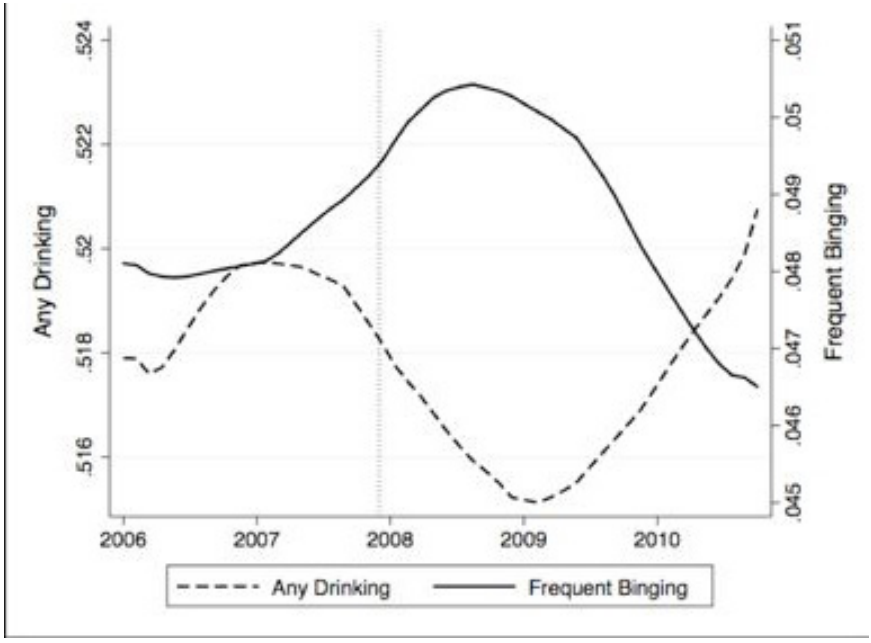
These correlations, in this case with only 19 data points, are pretty consistent across different recessions. Life expectancy and death rates go down when unemployment and economic growth are going down the toilet. This, I found very strange.

When looking at this in more detail, I discovered what is often called in public health "the ecological fallacy". The ecological fallacy means that if you look with a huge lens at the big correlations across entire populations, you can often correlate a lot of Xs and Ys, but that doesn't necessarily mean that X is causing Y, or at least not for everyone. What do I mean by that?

We looked at some of our country's individual level data, which is to say that rather than looking only at overall average life expectancy or average death rate; look at what happened to individual people due to individual causes of death. One of the biggest data sets in the country is called the Behavioral Risk Factor Surveillance System. It's done every year by telephone and

participants get asked numerous questions about everything related to health. It tracks a couple million people who are supposed to represent the country, spectrum of income, race/ethnicity, where you live, etc.

We noticed a separation in alcohol consumption, which also appeared to hold true for tobacco use, physical activity, nutrition, and a number of other risk factors that we know are related to our health. (Bor et al. 2013, Tekin et al. 2013)



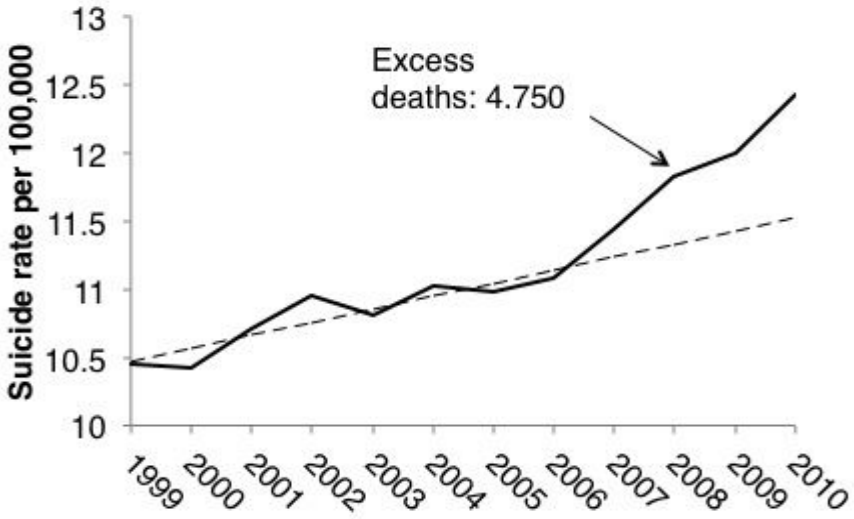
Alcohol use during the great recession of 2008-2009. (Bor et al. 2002)

The country became split during the recession. As shown in the panel above, reflected by the solid line (right axis) are a small portion of people who actually started binge drinking frequently during the course of the recession. The dashed line (left axis) are the majority of the people who actually decreased how much alcohol they consumed. What happened is that on average, you

or I had a couple less dollars in our wallet, and when we went to Trader Joe's we bought one less bottle of the two dollar Charles Shaw wine. This is called an 'income effect'. Given a little bit less income, we tend to cut down on desserts and alcohol, and other luxury items.

But there was a sub-population, not a small one–a few million people in fact–particularly young men who are single, and single older men near retirement age or those forced into early retirement during the recession, who at the same time started binge drinking. (Bor et al. 2013) On average, alcohol consumption went down. But hidden beneath that average was this rather vulnerable population, that in public health terms, we would be concerned about.

We kept finding this result in a number of different domains. The same results were found not only for alcohol, tobacco, and food, but also with suicide rates across the country. (Reeves 2012) The graph below shows the way they're typically plotted in public health.



Increase in state suicide rates in the USA during economic recession. (Reeves et al. 2012)

We can look at the overall trend that was expected and what would continue if that trend had continued as normal, then we define the difference between the observed and the trend as the excess deaths. Not to imply that the other deaths are not 'excessive', but these additional deaths are above what would have been expected if the trend continued from previous years.

What was curious is the suicides that occurred during the course of our recession were also among young, single college-aged people and older single men and women (the elderly or near elderly). In the same groups, curiously, the overall death rate went down and the life expectancy went up. Therefore, at least two things were going on at the same time. One factor was identified by the Department of Transportation. During the recession, a lot of people were unable to afford gas, and the Department of Transportation was taking note of traffic rates, the rate of traffic accidents in particular, was going down dramatically. Fatalities from motor vehicle accidents were going down. This effect was huge; motor vehicle accidents are a leading cause of death among the very young and some of the very old. (CDC 2012)

A second effect was also going on in nursing homes around the country. (Miller et al. 2009) There's actually a surplus of nurses available because some of the more skilled nurses were unable to find positions. During this time, the death rates from accidents, as well as in nursing homes, went down substantially, but primarily among a certain segment of the population that could afford more expensive nursing homes. So here again, we have this confusing situation. Motor vehicle accidents went down. Nursing home accidents and other related causes of death went down and this dominated the picture. But hidden beneath that are a group of people who are quite vulnerable.

This type of situation plays out a lot in public health and I think nowhere greater than during the course of our recent recession. But worse than our recession in the United States (US) was the one in Europe. And in Europe there was a sort of crystallization of this phenomenon in a particularly problematic form, which introduced the main theme of one problem I'll talk about: the concept of surveillance bias.

We've all heard terrible things about what's been going on in Greece, but what's really interesting is if you look at the official statistics from departments of public health and the National Statistics Bureau in Greece that collects statistics on health and death rates, you actually see, according to those statistics, that Greeks are getting healthier. It's not the same effect as what was going on in the United States where traffic accidents or less alcohol consumption was disguising the vulnerability, but actually less cases of infections were going on in Greece, and this was very puzzling.

Our colleagues over at the European Centers for Disease Control, (European CDC), were very suspicious about these statistics. Greece, after all, got itself into some trouble with some of its accounting that allowed it to enter into the European Union (EU). It turns out some similar things were going on in the statistic books for public health. (Stuckler and Basu 2013)

What was going on in particular was that offices that were in charge of reporting statistics on the leading causes of infection, such as human immunodeficiency virus (HIV) and tuberculosis (TB), weren't reporting any cases, hence, there were no cases of HIV and TB in some locations. There were a few places that were still reporting, but those weren't extrapolated to the rest of the country. These cases were simply taken as the sum total of the country's cases. This is a bit problematic.

Our colleagues at the European CDC did something that took a lot of time, but was probably worth the effort. They went around to the various emergency rooms, places that don't have the time or resources to actually go and do the formal reporting that these other offices are supposed to do, but where they still do the diagnosis and the treatment. And they went through the charts, one by one. Some of these places used paper charts. It was a fairly labor intensive project. Not what I would recommend for an undergraduate summer internship.

They went through the charts and looked at the number of new diagnoses, and sure enough, in association with the co-diagnosis of new heroin use, there had been a massive rise in HIV. (Kentikelenis 2011) What was also striking was that malaria, which we typically don't associate with Europe, actually had a major outbreak in Greece, as a result of a cut in one of the mosquito control programs. (Ibid) It too wasn't reported in the standard way, but the group Doctors without Borders, which normally sends physicians to places we consider severely under-developed, refugee camps and so on, sent a team for the first time to Greece, one of the pillars of ancient medicine. (Stuckler and Basu 2013) And it was with great irony and regret that a team was sent in order to control what is now a very large malaria outbreak.

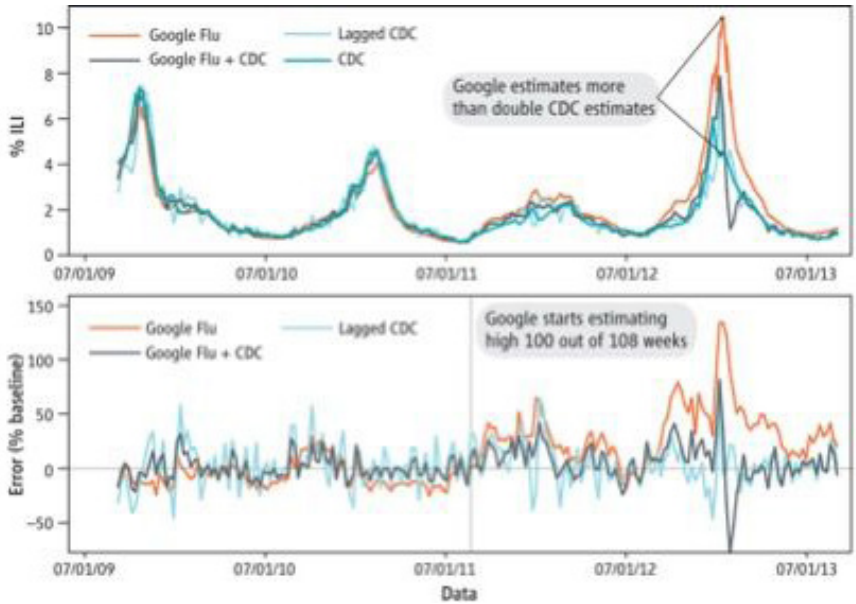
So, in order to get to this question of what do we think about and what do we track when we track our public health, I'm going to make an argument about surveillance and surveillance bias that gets me into a lot of trouble at Stanford and Silicon Valley. The reason is that there's a lot of enthusiasm to replace our traditional boots-on-the-ground strategies for public health with methods that are very intellectually and technologically innovative, but that I will argue, are insufficient.

One of the recent examples is the attempt to replace some of our surveillance systems with online-based systems. So, how do we know what we think we know about health in the US? If you were to go on Google and type in "what's the prevalence of hypertension in the US?" you'll get a lot of different blogs and hits and finally, you'll undoubtedly end up at the Centers for Disease Control (CDC) statistics site, which is where all the repositories are kept. You'll find links to some of the major health surveys that are going on throughout the country at any given time. The largest of these is called the National Health and Nutrition Examination Survey or NHANES. People use this all the time to determine the country's rate of say, high blood pressure or high cholesterol among this or that group, or in this or that place.

This is very intensive to do. And it's always amusing to me to describe to students how they actually assess these numbers. They don't go to doctors' offices, because many people have high blood pressure and they haven't been to the doctor, so they're not diagnosed yet. That wouldn't be accurate. So what they do is they take RVs, literally vacation-style RVs, and they've refit them. Instead of mattresses, chairs, and tables, the inside of the RV is converted into a medical exam room and lab. (Curtin et al. 2012) They drive the RVs around and they go to the Target parking lot or the Safeway parking lot, and they literally accost people. They say "Hey, would you mind getting a swab and a blood sample, and a prostate exam?" The few people who are willing to do these things generate where our country's statistics come from. How many people actually have high blood pressure and how many of them actually know it? How many of them are taking a blood pressure pill? The CDC will drive these RVs around the country and attempt to answer these questions.

As you imagine, aside from being an embarrassing job to have, it's very intensive, and it costs money. So the idea came, why don't we replace this with online mechanisms? If you have the flu, you're feeling feverish, chills, sweaty, you might have some diarrhea, you might have malaise, you might be coughing– so you might try typing these things into Google. That's the idea. What should I do? These are my symptoms, what do I have? Google, and a number of other places, came up with the idea, let's follow the Google searches, Twitter feeds, and these Facebook posts where people are saying "I feel miserable".

In the panel below, on the Y axis are the influenza-like illnesses tracked over time. (Lazer et al. 2014)



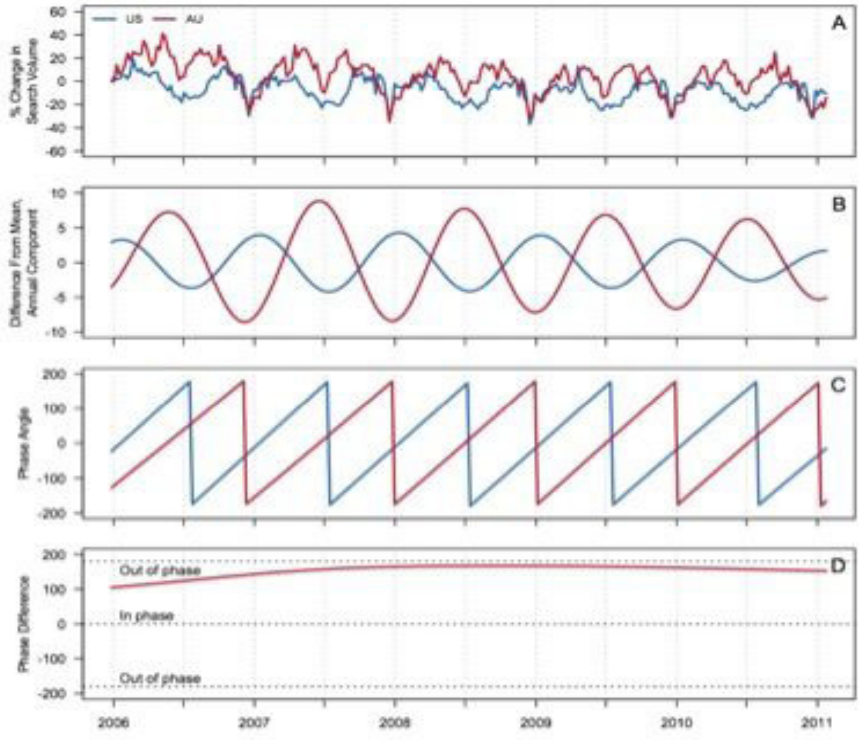
Google Flu Trends Still Appears Sick: An Evaluation of the 2013-2014 Flu Season. (Lazer et al. 2014)

There's all sorts of wave patterns. The argument had been, forget this intensive boots-on-the-ground work, let's just track online

symptoms and see if we can keep track of these illnesses. There's a little problem. Using this Google-based mechanism, the alarm bells kept going off every couple of weeks suggesting that we were finally hitting the peak of the flu epidemic, which is an important time for public health people because it indicates a few key things; when to purchase vaccines, and when to buy anti-virals because there are certain populations that are immune-compromised (pregnant women, the elderly) for whom the flu is not just a regular flu, but potentially deadly. But these online systems were wildly inaccurate. (Lazer et al. 2014)

A similar problem happened with the HealthMap system where people can self-report online "I'm having these symptoms and those symptoms". They can say "Oh, looks like there's an Arbovirus outbreak in Sacramento". That was the theory at least. The dilemma is, everybody's having these symptoms all the time. It's not clear that it's necessarily the flu or something else. And the second dilemma is, who are the folks who are spending all their time online typing in these millions of symptoms? It's probably not the same folks who are the hidden binge drinkers.

Below is an example where people are trying to track depression. (Ayers et al. 2013) They were looking for Google searches for depression in the US and in Australia. The question is, how does seeing that there's a spike in depression symptoms on Google actually help you find those people? You could do the National Security Agency or NSA approach, and track down their computers. That might not be taken very well. But realistically, how does it help you in any practical way to prepare for such an influx of depression?



Seasonality in seeking mental health information on Google. (Ayers et al. 2013)

I would argue for a so-called "old school" approach. What we've been doing in and around the Central Valley in California has highlighted for me personally, why the online-based approach, or at least a dependency on the online-based approach, is I think fundamentally misguided due to the issue of surveillance bias. We train people called Community Health Care workers. They're folks who are sometimes trained at the nursing level, but often at lower levels, and they go street to street as members of the neighborhood. They go house to house, or sometimes to the median of highways, sometimes to parks and they interact with folks who don't have addresses, don't have phones, and certainly aren't searching the Internet for their symptoms.

The news program 60 Minutes did a special segment on one of the groups that has been going around the Central Valley in the context of the recession. (Pelley 2011) There have been many children whose families have moved into highway motels after foreclosure. That, of course, costs money, so after running out of money, they moved into vans or trucks on the edge of the Big Box store parking lots. These are places where people can park their van and live out of the back of the van and won't be harassed because it's a huge Safeway parking lot or Target parking lot and they can permanently or semi-permanently camp out there.

And so, we do our usual knocking on doors and do blood pressure screenings and whatnot, and we were noticing that these kids were starting to get illnesses that aren't reported, certainly not on the online system, but also aren't being found in some of the more traditional systems either. For example, they would have scabies, a disease we normally associate with the homeless in urban motels. Tuberculosis in Alameda County, which contains the city of Oakland, for example, had a dramatic decline in the official rates of tuberculosis. Well, the TB office wasn't reporting it and the CDC wrote a paper in fact saying "Oh, in the context of the recession we think there are fewer immigrants coming over, it's not as attractive, so less TB." (Winston et al. 2011) However, if you go through the emergency department cultures, the spit that they send out for testing, you can go back and trace how many of those ended up positive for TB and didn't go to the TB office. It turned out to be about 70 percent. So the system had failed to report the actual cases of TB, which was flourishing in these conditions of very tight living arrangements–conditions which we often see spreading airborne disease. (Stuckler and Basu 2013)

What I would argue is that in a lot of cases, our standard surveillance system is missing people; certainly the newer and fancier surveillance systems are almost designed to miss people.

What is really curious is that these folks, they're not going to doctors' offices often. There are also a lot of rumors about Obamacare that are affecting people who think they're going to get charged fees. They're generally staying away from healthcare services other than the emergency room, but there is a set of safety nets that they're very much tied to. And those are actually safety nets tied to very short-term, immediate needs: income, food, and housing.

Let's look, for example, at food stamps, what's now been renamed the Supplement Nutrition Assistance Program, or SNAP. SNAP participation coincides very closely with poverty rates and unemployment. It goes up and down with the recessionary cycle. Some people decide to use it as an additional economic metric. Similarly, the Temporary Assistance for Needy Families, or TANF, which used to be called welfare, also goes up during recessionary periods of unemployment. And so, people are able to tap into these programs even when they're not tapping into the formal public health program. (Rosenbaum 2013)

My proposition is that if this is the case, if people are being missed by our usual public health systems, but are tapping into these other programs–programs that are not health related. Is there a way to (a) study how these programs are affecting their health and (b) adjust the programs to promote health?

There's been a tremendous divide and a great deal of conflict in answering the first part of that question. What is the role of these public programs on health itself? The data in the academic literature are as conflicting and inflammatory as are Fox News and MSNBC. They're very polarized and you can find many papers suggesting these programs both help health and hinder it. Income support programs or welfare programs, food security programs like the food stamp program, and housing programs, are three big sets of programs where you can find people claiming that programs harm health and improve health.

Not too long ago, Fox News ran a picture in which someone claimed that a marijuana dispensary in Colorado accepts food stamps, (Hansen 2014), which presumably wouldn't work because food stamps are not a stamp, they're a debit card. You also have to be registered as a seller of food for it to work. Jon Stewart, a well-known comedian on Comedy Central's Daily Show, parodied this claim: "Fox News: We read the chain emails your grandma gets in her inbox out loud like they were true." (Isquith 2014)

This is the polarization of debate in the country. I would argue that there is a third path, where we can look reasonably at the data. In looking reasonably at the data we can try to ask the following questions. Why are there conflicting results? What are they being driven by? And can we learn from them in a way that we can adjust the programs to be the most effective?

So, beyond the polarized debate, I'll talk a little bit about what data we really have on the effects of safety nets on health. What are the limitations, and can we study them in a better way?

Every time I bring up this topic, however, I'm asked one very important question, which is, "Why are you, particularly as a physician, going to talk about non-health programs and their health effects first and not first talk about health insurance or health education?"

Health insurance, I'm all for. But there's been a number of studies asking how many preventable deaths among young people in the US can actually be prevented by singling expanding insurance rates? These studies looked at all the causes of death in the US among people less than 75 years old that were classified by the Agency for Health Research and Quality as being so-called preventable deaths. What that means is, we have a known treatment that is curative for them. There's something that if the person got treatment for that acute episode, there's no reason they

should die. We have the antibiotic or we have the drug or we have the mechanism to treat it. Researchers identify the immediate causes of death—infection of the foot, a traffic accident, whatever could have been immediately treated properly and the person wouldn't have died. In how many of those cases would the person have had a significant increase in life expectancy given insurance? I had expected the number to be about 85 percent. The answer was more in the range of 15 to 20 percent. (McGinnis et al. 2002)

What was going on with the other 80 to 85 percent? In most cases, there were chronic underlying conditions that even if the immediate cause of death could've been prevented, the person would have gained very little life expectancy. For example, a person who is smoking tobacco has their first heart attack, but is mistreated or under treated because of lack of insurance; the likelihood of a second heart attack in five years is tremendously high. Similarly for diabetes, if you believe the article that came out in the New England Journal of Medicine recently, even very, very tight control for diabetes, for the hyperglycemia of diabetes, increases life expectancy marginally to non-significantly. (Zoungas et al. 2014)

The majority of health conditions in the US are really attributable to what we can pejoratively call 'behaviors' – nutrition, physical activity, smoking, drinking, etc. The stuff that we all know we are not supposed to do and yet, we're still doing. Reasonably, the problem was first responded to with a series of massive health education programs. What I mean by that is not modern marketing messages; I'm referring to a guy in a white coat whose saying "Eat your broccoli". Over the last several years we've had many–see below for the list of randomized control trials of traditional health education.

Randomized trials of health behavior change programs
Cardiovascular community control programs
Stanford Heart Disease Prevention Program
Stanford Five-City project
Minnesota Heart Health Program
Pawtucket Heart Health Program
Heart Beat Wales
COMMIT study

In these randomized trials, there was essentially a non-significant effect. (Ebrahim et al. 2011) Years and years of work, millions of dollars, and this keeps repeating itself over and over again. It sounds intuitive that if we just lectured people long enough, that we would be able to get them out of smoking and drinking, and bad nutrition, and not enough physical activity. It doesn't seem to have actually happened. And I'm sorry to say that two of the biggest and most expensive trials were at an institution I call home.

So, if this is the case that at least the traditional method of health education and health insurance isn't fully effective, can we actually determine if some of these non-health programs can promote health in ways that are more effective? I think the biggest dilemma in our field for studying these programs has been one persistent methodological problem. Imagine we're in a perfect world and we can do whatever we want with these programs, what would you want to do? I would want to test whether these programs worked.

Let's say I wanted to test whether a welfare program improved or harmed your health. When I give you a welfare check, do you just go spend it on booze or do you use it for healthier fruits and vegetables? That's basically the polarized debate. What would I do? I'd take an average group of people. I'd flip a coin and I'd randomize them to enter into the program or not. Why do I want to do that?

The value of randomization and experimentation is huge, because if I'm just comparing the people who are already in the program to those who aren't, I have this massive problem of selection bias. That is, there are other things I can't control for that are causing people to enter into the program versus not. It's not just their income. There are already lower income in the program versus not. I can control for that, statistically. But it's also other things. Where did they grow up? What was their family environment like? Do they have a supermarket in their neighborhood? All sorts of things that are probably not in any of our databases and, even if they are, there are many things that haven't been thought of that are unmeasured. And so, if I randomize people like I do in a study of a drug, I can try to control all that rather quickly. There's an equal number of people with bad childhood experiences on both sides, and I can give one the drug, or in this case, the welfare program, and the other group the placebo, or not the program.

In many cases, it's unethical to do that, and that's one of the biggest dilemmas. You can't take a bunch of homeless people and say "you're going to get houses, you're not going to get houses, and we'll see what happens to your health". So you have to do some indirect inference. And therein lies the problem. It's hard to do a randomized trial, or it's often unethical to do a randomized trial, so what do you do to control for all those other factors that you're not measuring?

One of the techniques that we often use is known as an instrumental variable. This is something in the environment that essentially randomizes people to be encouraged into the program or not. What do I mean? A classic example is with tobacco. Tobacco, as you probably know, doesn't primarily kill people through lung cancer. Lung cancer is still relatively rare. Tobacco kills people mostly by means of coronary heart disease, heart attacks. (Ambrose and Barua 2004) Epidemiologists in fact studied

their friends who were doctors in Britain. They were finding that the doctors who were smoking were dying of a lot of heart attacks when compared to the doctors who weren't smoking. (Doll et al. 2004)

The group that used to be called Phillip Morris at that time came back and said "no…no…no. People who suffer from heart disease are often depressed, and you have just found a reverse causation." (Glantz et al. 1995) Depressed people become satisfied and happier with cigarettes, and that's why you have a correlation between cigarettes and heart disease. We can laugh, but as a statistical person or epidemiologist, one has to genuinely deal with this possible reality and say "I think it's bogus and here's my evidence." What did the epidemiologists do? They did something quite creative. They said, "Well, we had to find something that's correlated with how much you smoke so that we can also correlate it with how much heart disease you get, but doesn't have this reverse causality that heart disease doesn't cause you to do more of it." And they found that the most useful so-called instrumental variable was tax rates. At the time, people weren't taxing cigarettes especially, as compared to everything else; they were just using a sales tax.

They found quite robustly that in states that have high sales taxes, you get lower cigarette sales for the same kind of person, and those lower cigarette sales would relate to lower heart disease and vice versa. Lower sales tax rates, higher cigarette use, higher heart disease. (Mullahy 1997) But there's no reverse causality. There's no governor that I know of that increases or decreases the sales tax rate based on heart disease or the number of heart attack deaths, right?

So, this is a sort of trickery that we use in order to try to understand how social influences can influence people into or out of programs. It's kind of a randomizing factor that helps us understand the

impact of the program exposure on the outcomes of interest. We applied this to income programs, for example.

One of the largest income support programs in our country is not in the form of a standard two-week check. It's the Earned Income Tax Credit. It's a credit back to people, in this case, particularly low income women who are working. But, interestingly, there were a lot of variations in how states administer the program and the time at which they enacted the program. So, you had a so-called natural experiment. Different states had otherwise similar people, some of them got the program first and others didn't.

Deciding whether or not they got the program was not based on public health statistics. But if you want to know the impact of the program on public health you can use that variation and compare otherwise similar people, one of whom got the program and the other who didn't. We found profound effects of the program on birth weight. Effects that are just enormous, way beyond the effects that one sees beneficially from our prenatal care programs. (Strully et al. 2010) This was a very embarrassing finding. Humility in medicine is just not an "in" thing. Another interestingly thing we've found is that these women who got enrolled in the program, as compared to those who didn't, would quit smoking. And they would quit smoking at rates that exceeded the rates that I can achieve even in a perfect world with the pills, patches, and gums that I am dispensing out of my clinic. Why was that?

We did some qualitative work on the mothers and they said "Yea, well for 20 years I was told to quit smoking, and frankly, life was not going to do me good if I tried to quit smoking. I needed it, but with the additional income and the stabilization, I finally said maybe I'll finally address that other thing." And so, quitting smoking from this program was actually more effective than a lot of the Verenicline and nicotine patches and all this stuff that we're prescribing. (Lancaster et al. 2000) My colleague, David Rehkopf,

studies the other variation that's still going on in the program, which is that people often get the credit in February and March, when the tax credits come back, so he compares the same person and how they behave after they get the credit in those months versus that person in the other months. What a better control group than yourself.

Here's where the complications come in. The impact of the higher income wasn't universally positive. It definitely again helped quitting smoking to the same extent as in the other study, providing some independent verification. It reduced food security, that is your ability to get food, but it really worsened nutritional outcomes. (Rehkopf et al. 2014) And after doing some more detailed analysis, what essentially was going on was, the people who were so poor that they weren't eating enough food were transitioning just to the point of poverty where they could purchase food, but it wasn't very good quality. These aren't folks who are shopping at Whole Foods. They were finally getting a meal, but the meal was what we would consider junk.

So this brings me to my question of how we might adjust the programs, and I'll come back to that later. I'll mention one other program that is also an income generating program, but has the same theme. This theme: it's not just the income per se, but how one delivers it that might be critical for health. There are programs called Active Labor Market programs, or ALMPs. They were started in Finland. And Finland went ahead and said 'you know, this is so important to our society, we're just going to randomize people to it.' I don't know how they got the approvals. But they randomized people to get the program or not, and the program is that after you're laid off you either get a pamphlet and packet of papers like we do, or you get a person who you meet with in an office once a week who says 'Here's how to get into shape. Here's how to wear a suit. Here's how to do your resume. Here are some programs and some companies that are willing to work with you

and we're also going to call the companies and harass them into at least offering some part time work,' and they work with you as you get a new job.

We were able to replicate this in Detroit through a natural experiment, as opposed to a randomized approach. Some locations and counties were able to administer the program, the other ones wanted to delay a few months, and we could compare them. And we found the same results as in Finland. There were very big reductions in things that are associated with mental health and the sort of mental health benefits of having a job. Now, people who are actively working in their current job never say that they have mental health benefits from working. But the mental health reduction from unemployment is really very powerful. (Stuckler and Basu 2013)

What was curious to us was that this experiment was then introduced in New York City. And none of these benefits were observed. In fact, New York City tried to semi-randomize it in order to make sure that they were estimating the effect of the program correctly, and they were. And there was no effect. So, we visited the program, and herein again is the theme of not just how much you're providing the person, but how it's provided. I walked into a room, where in order to get the benefits from the city–this is not the state or federal welfare, but a city-based additional welfare program–you have to spend two weeks in this job retraining type program, an active labor market program. And in this room there were a bunch of people sitting on the floor, there was one broken computer in the middle and there wasn't even a staff member. Some folks had given up, and they just left and said 'forget about it, the benefit's not worth it.' Other people were persistent and they sat in the empty room, eight hours a day, for two weeks. (Stuckler and Basu 2013; Coutts 2009) So, it's about how you deliver the program.

What we've been doing is trying to study some of the programs that are willing to experiment a little bit and understand if we can address some of those factors that popped up in some of our earlier studies. For example, the fact that many programs that support income simply deliver it as a check, and 'whatever happens, happens'. There's a large number of programs that have tried to do something a little bit different. One is to make incentivized savings programs. So instead of getting a debit card in the mail or a check, it goes into a savings account. You still have the debit card associated with it, so if you need to go and buy your groceries, you can without any impact, but you also get a little text message that says, 'Hey, your payment came through, but if you save 20 dollars of it for next month, you get an additional one or two dollars.'

This seems like a very small amount. I was very skeptical that this would provide any incentive at all. And they compared the people who got the incentive to those who didn't, and the people who got the incentive and text message and those who didn't. And in the end, it was the group that received the incentive and the text message that saved roughly four times as much as any of the other three groups. (Clancy et al. 2001; Mills et al. 2008; Sherraden 2000; Ariely 2014)

Not only did people save, but it was particularly effective when the program was adjusted a little bit for what I'll call the Ulysses Effect. If you remember the tale of Ulysses, he sailed down in the Odyssey towards the Sirens. There are vicious mermaids that are going to kill everybody on the boat, and what does he do, he decides to tie himself to the mast so he isn't tempted by the Sirens. All of the other people who have to row, he blinds them and puts whatever their equivalent of cotton was in their ears so that they can't hear them, so they can keep rowing. There's a very similar effect when it comes to things like savings and health.

When people were asked to name a goal for themselves just before they got their check, such as, 'What are you going to do with the money this month? What do you want to work on?' People came up with all sorts of interesting things. I'm going to work on buying a gym membership. I'm going to work on saving for my kid's education. I'm going to work on getting more fruits and vegetables in the house. They were about 35 to 40 percent more effective in different studies at actually accomplishing those goals, very significantly so, and what was interesting is, the counties that did this were able to cut back on the amount of the incentive they were paying. (Ariely 2014; Giné et al. 2010; Camerer et al. 2011) They got the same effect in terms of public health, tobacco smoking, alcohol abuse, healthy diets, while actually spending less. The delivery of the program therefore is a key.

It's in this context that we've had one of the biggest controversies when it comes to public health and the recession. Many people saw the news reports that came out from a study on food stamps and obesity. (Leung et al. 2012) This is a correlation and comparison of obesity among people on food stamps versus obesity among people not on food stamps. Guess what the conclusion was. Do food stamps make poor people fat?

What's going on in this study, I will argue, is similar to what was going on in the earlier problems. The dilemma of selection bias. There's a million things going on in the lives of people who are on food stamps. Some of them we can control for, like income. But who knows what's going on in order to determine whether or not there's a supermarket in the neighborhood? Some of my patients go and buy food from the gas station because that's the supermarket they can access.

A more careful analysis would use the instrumental variable technique. There are variations between states in how they administer food stamps, big variations. For example, in some

states, you can renew your food stamps through text message or email, very simple. In other states, you need to do full biometrics. You need to get fingerprinted, so you might feel a bit like a criminal when you're getting photographed and fingerprinted in order to get the potential benefit. You can use that variation because that is kind of an instrument. It's either encouraging the same person to get into the program or discouraging them. And that's not dependent on the obesity rate. That's decided by local and state politics. So, you can use that variation to say: the same kind of person is either encouraged or discouraged into the program, compare the same kind of person in these two scenarios– are they really obese or not obese?

The result was again complicated. (Baum 2011; Ver Ploeg and Ralston 2008; Todd and Ver Ploeg 2014) Among people who were short term or medium term users of food stamps, the correlation with obesity went away. Among people who had been on food stamps long term though, the correlation remained. One of the most interesting points was that those on the program were in this cycle that is now often called the 'food stamp cycle'. That is, they would get the food stamps or SNAP benefits on their card, and they would immediately go out to the big box store in their neighborhood and stock up for the month. It seems like prudent shopping. They'd buy the cheapest stuff in the biggest bulk for the month and what would happen is this massive cycle of purchasing. (Wilde and Ranney 2000) And then, not eating as much or not purchasing as much for the rest of the month. And a lot of people would actually just run out well before the end of the month, because they were presumably trying to plan for the month, but they had bought too much and possibly eating too much of their budget early on. So the rest of the month they were eating more or less junk, or very little of anything.

The thing about obesity, and similarly with diabetes, is once you eat the bad calories, not eating as much later doesn't neutralize

things out, as I think all of us have unfortunately found after Thanksgiving, for example.

So, this cycle would go on and obesity and diabetes rates would increase among those on food stamps. (Seligman et al. 2007) But again, this might be a case in which academia is asking the wrong question. Rather than asking the question, 'Are food stamps leading to obesity?' what we might be asking is 'How do we adjust food stamps in order to maximize health?' And herein was one of the biggest ironies, which is the way that food stamps are currently administered. Among food stamp users, as in the rest of the country, about 10 percent have diabetes, mostly Type 2 diabetes, meaning adult onset. And what we were finding was towards the end of the month, these people with diabetes, 1 out of 10 of food stamp users, which represent 1 out of 7 in the US, (yes, it's really that high), would end up in the emergency room and get admitted to the hospital for hypoglycemia, low sugar. (Seligman et al. 2014) They were doing what their doctors told them to. They were taking their medications for diabetes, but they weren't eating as much because they'd run out of the food money. So their sugar would drop. They'd faint or fall over on the sidewalk. Somebody would call an ambulance and they'd end up in the emergency room. Some of them were in such dire straits they would be admitted.

Just to make sure this was not some natural cycle in all diseases, we compared this to appendicitis across the course of the month. (Ibid) When your appendix bursts is entirely independent of what you do. The question we asked is: how much does this cost versus how much does the extra food cost to prevent the end of the month cycle? These admissions and hospitalizations, depending on which health system you have and insurance, are about 7,000 dollars to roughly twice that much. The amount of food to prevent it, about a hundredth of that cost. (AHRQ 2012) So, the question of apportionment and prevention comes into play in terms of

determining how one might actually adjust these benefits to promote health.

Interestingly, the United States Department of Agriculture (USDA), which administers the food stamp program was convinced enough by these kinds of findings that they started a pilot program. They said, "Okay, the net cost to the government is high. Can we increase the benefits? But we can't politically just increase the benefits. That's not going to fly in Congress. What we can do is call it a financial incentive, and limit what people can spend it on. They can spend it on fresh fruits and vegetables." And they were actually able to do it in a randomized way. They randomized people in Massachusetts to get the regular benefit or the regular benefit plus this fruit and vegetable subsidy. (USDA 2014) It was a lot, 30 cents on the dollar. But that's how much the budgetary difference is when you account for all those medical expenditures. They similarly did this among the women and infant children's program, WIC program, which serves mothers who are pre-pregnancy and post-pregnancy, and their children. (Leibtag and Kumcu 2011)

They called it the HIP program, the Health Incentives Program, and they created some pretty clear labels around the various places where people use a lot of food stamps, and did some key partnerships with the big box stores in order for them to have such fresh fruits and vegetables available. It wasn't just coincidence that stores like Target started having a grocery section. It was actually a big boon to them too, since the money is being spent at their stores. In fact, they were initially complaining about the once in a month cycle, because everyone would flood their stores after the benefit day and they would just have a terrible time of stocking their merchandise and dealing with the lines, and there was a stampede at a Walmart and all this kind of stuff.

The HIP results, which came out recently were really encouraging. (USDA 2014) Not only very significant increases in fruit and vegetable intake, more than we've ever seen in the nutrition field, but interestingly, a phenomenon of substitution. People weren't just eating more when they had more money. They were actually substituting junk for the healthier stuff, mostly in the form of refined grains. We don't often mention scurvy in the US because it's no longer a tracked disease, but if you go to the county health departments, they do track levels of vitamin C deficiency, which is actually a bigger problem I would argue than vitamin D and testosterone. This was the first time one saw normalization among the low income populations of vitamin C levels.

The same results happened in the WIC program. Interestingly, many of you probably heard that there was a big report about the first decline in obesity to ever be witnessed in the US, and it was among ages 2 to 5 years old. When you disaggregate this data further you see it's only among the participants of WIC. (MFHS 2014) So, it's strictly among this one program change, which affects a huge amount of people, you get a population level reduction in obesity among the very young. It's interesting how much increasing evidence is going on that obesity is starting incredibly early, possibly perinatally.

The question about how to deliver programs better, but also within limited budgets, has also been tested using this kind of behavioral economic framework in which we think about scarcity. How do people behave in the context of extreme deprivation? There's a lot of interest in this because of a number of experiments that were elegantly done showing whether you're rich or poor, or highly educated or not, if you play the same kind of video game in which you're given a limited amount of video game money, you behave very differently than when you play the same video game and you have a lot of video game money. (White and Basu 2014; Shah et al. 2012) Making cognitive decisions under the stress of having

limited resources, no matter who you are, you often end up making what we would call poor long term decisions in order to make good short term decisions.

There was a natural experiment in Peru that tested this. The Peruvians delivered their food stamp program twice a month, because they simply chose that that was an appropriate time, and they stopped doing so because it was administratively burdensome for one of their banks, and so they went to a once a month system. And interestingly, in terms of how much of that money was spent on things like alcohol, it increased under the once a month system. And in the control populations, regions that didn't get the benefit, are more or less the same.

The interest here is that the same amount of monthly benefit was delivered twice a month, and people made what we would call healthier decisions, by just having shorter term, more immediate decisions to make as opposed to having to plan over the whole month, with the same amount of money.

A similar finding is emerging in the housing literature, in terms of the effect of housing on health. I would be remiss to not talk about housing in the context of the foreclosure crisis. It's been one of the biggest debates we've had. And again, there's been polarized results about whether improved housing programs, in terms of housing and urban development (HUD) programs, are correlated towards improved health or not. One can correlate HUD programs with increased violence or increased drug use. There are also some programs that correlate housing and urban development programs with improved public health. (Shaw 2004) How might we dissect what's really going on? Again, randomization helps because the folks who are entering into the program can't be compared to the folks over in the next suburban neighborhood.

There's been two interesting experiments. One was in Boston, in which the public housing program had, because of construction

contracts, an accidental experiment. Some of the units were able to be fixed in a certain way, and due to construction materials snafus, which can only happen with the Boston construction industry, another set of buildings that was right next door was unrepaired and immediately one saw the repaired program housing asthma rates among children go down. (Clougherty 2006)

Similarly, a program happened in Denmark in which refugees from the wars in northern and eastern Africa were sent to Denmark. Denmark had an explicit policy of distributing the burden of refugees among different neighborhoods. Rather than having them all in urban ethnic enclaves, they would force the different mayors of the different towns to take a few refugees each. And the health of the refugees was essentially identical upon arrival, but over the next 20 years we could follow them. And those who lived in the neighborhoods that had the cleaner air, better access to good supermarkets, and so on, had much better health outcomes among otherwise very similar people. (Damm 2009; Edin et al. 2003) Essentially, a randomization of people into neighborhoods.

Of course, the most famous such randomized study is the Moving to Opportunity Study. People were randomly assigned to get a voucher in several US cities. And the voucher said, 'you can move to a higher income neighborhood or not', and there was also a control group. And those who moved to the higher income neighborhood, that had better access to supermarkets and so forth, had pretty significant reductions in being overweight, obesity, and a marker of diabetes control. (Ludwig et al. 2011) The problem was that one can't take every poor person in urban zones in the US and say 'why don't you move somewhere else?' Who's going to be left?

And so, Seattle said 'why don't we try something different?' They took people who were marginally housed or homeless, and they randomized them into programs in which they'd first give housing

and then support for things like drug and alcohol use. (Collins et al. 2012; Larimer 2009) As opposed to the traditional method, which is you show up to an office and if you're clean and if you've got your stuff together, and if people are willing to support you, then you can get onto the housing list. It was actually found that the reason Seattle cared enough to pass this into law eventually was that they saved money. In particular, from incarceration and emergency room visits among the group that they housed first. They stabilized people by giving them housing first and then dealt with the alcoholism and drug use and all the other things going on. The program was refined a little bit further, and we've replicated it in San Francisco, (Krieger and Higgins 2002) when people had salient short term, self-selected goals, this Ulysses contract, so we asked people, "okay, we'll help you get the housing, which goal are you going to work on first?" And some people said they wanted to rehab from alcohol. Some people said reuniting with family, that's a big first one, where a lot of other interesting things follow if that's successfully accomplished. And when housing was tied to that, the city was able to save quite a bit, particularly on jail costs, as well as emergency room bills.

We've devised and implemented some new methods so we can study this more rigorously against other cities because the accusation is 'you are all hippies from San Francisco', so we can devise some novel methods in order to create fair comparisons among people with very different towns and cultures. From this kind of literature we ultimately see a few consistent conclusions. In most of the country you could say that our health problems are so-called behavioral – smoking, drinking, nutrition, physical activity, all sorts of things ultimately come down to behaviors. But in our field of public health, it's been rare to find really successful behavior change programs. Part of it may be that a lot of our videos literally look like some guy at the National Institutes of Health in a white coat, saying "broccoli is good, alcohol is bad," and no one watches them.

But a lot of what also drives behavior, I will argue, is indirect – social, economic factors. And a lot of our public health programs don't reach them directly. Therefore, we might be able to use the indirect non-health programs, think about how we can do trials on them or at least better control for the selection. This way, we're not always correlating poverty to bad health outcome and claiming that the program's the problem. I would say that we can repair some of the literature we have in public health and do better academic studies if we address some of these fundamental problems from our prior papers.

One of them is the surveillance bias issue. We're often seeing fewer problems and saying that people are getting healthier, in part we're also missing the people who are most vulnerable.

Second is selection bias. I know this sounds very old school, but randomized trials are important for a reason, and if we're going to spend huge volumes of money paying drug companies to randomize their latest drug to placebo groups versus their drug group, I think we should spend a fraction of it to see how our nation's biggest programs actually affect health or not.

More importantly, how we can improve these programs or adjust them to improve public health? Even though I'm a card-carrying physician, I would say that health doesn't start on the exam table. It doesn't start in the pill or with the prescription pad, but it starts really in people's homes, in the quality of the air they breathe, or the food they eat, the quality of the household. If we really believe that, then our health policies are really just community policies. And these policies are first and foremost, in terms of importance to our health.

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