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Here's to a Long Life: Understanding Life Expectancy

Life expectancy takes on greater importance as Baby Boomers retire and we begin to realize the "risk" that a large group of long-lived beneficiaries may strain public and private retirement and medical plans.

Projecting life expectancy is the topic of the interview conducted by Dr. David Wesley, Vice President, Medical Research & Development, with Dr. Jay Olshansky, Professor of Epidemiology and Biostatistics at the University of Illinois at Chicago. Dr. Olshansky cites weaknesses in traditional models and emphasizes the need to focus on the health status of the living when forecasting life expectancy.

Jay has published numerous papers on aging and life expectancy. He is a frequent presenter at medical and insurance meetings. Jay earned his bachelor's degree in psychology from Michigan State University and his MA and PhD in Sociology from the University of Chicago.

David Wesley: *Our clients need to predict future mortality, but many business leaders are uncomfortable with simple linear extrapolation of previous mortality spreads. You have been a proponent of what you term three-dimensional forecasting. Will you please explain?*

Jay Olshansky: The key component of three-dimensional forecasting is that it factors in the health status of the living when projecting life expectancy. Most researchers have generated these forecasts by looking into the past. They take historical trends in life expectancy at birth or at later ages and essentially pull out a ruler and extend those into the future.

For example, let's say you're looking at life expectancy at age 65 and higher for the last 50 years, and you want to project forward. Linear forecasting completely ignores the health status of the living population; it assumes that trends observed for populations that have died will continue into the future. With three dimensional forecasting models, we take into account the health status of the populations that will experience the mortality that you're forecasting.

DW: *Can you give us a specific instance where linear modeling has missed or would miss the mark?*

JO: Yes, I can give you a couple examples. Several years ago, the Social Security Administration was forecasting death rates from diabetes. They looked at historical trends in death rates from diabetes going back the last few decades and extended that trend forward. What they failed to consider was the dramatic rise in obesity that had already occurred but which had not yet expressed itself in its impact on diabetes. As these more obese generations move through the age structure, we would expect to see a higher rate of diabetes than previous generations. By using linear forecasting models this experience is completely lost.

Another example is what happened in life settlements about 10 years ago. These products were created by companies that basically depended on the linear approach to life expectancy. They used life tables that were about 10-15 years old to generate estimates of duration of life for these individuals. Using older tables and not factoring in the surviving cohort can lead to the risk of underestimating life expectancy.

Life Expectancy Determinants

DW: What are the biggest determinants in extending life expectancy and how has this changed?

JO: The vast majority of the decline in the death rate and the rise of life expectancy observed in the 20th Century was due to reductions in early age mortality. Now we must rely on death rate reductions in middle- and older-age mortality, which is far more difficult to accomplish.

Preventing the death of a child from an infectious disease can yield decades of life for that individual. But if you save the life of someone who has already lived six, seven, eight or nine decades, you're adding a comparably smaller amount of survival time because now you're also battling the biological process of aging itself and associated major chronic diseases. We are moving into a state of diminishing returns. Even a cancer cure would yield only about a 3½-year increase in life expectancy at birth.

DW: Concern about pandemics comes up periodically at insurance industry conferences and even at company management and board meetings. Do you know if demographers consider catastrophes such as pandemics in generating estimates of life expectancy?

JO: I've never done it and I've never seen anyone else generate estimates based on such events because we really can't estimate the effect of catastrophic events on age-specific death rates. You can do it in theory. You can go back to the 1918 influenza pandemic to see the impact that a major pandemic actually had on life expectancy; I think it was about 2½ years over a very short time period. I suppose one could use that as a model but we have never had anything quite like the 1918 influenza pandemic happen again. We've experienced only two other pandemics since, and they only yielded relatively small changes in life expectancy. So no, there hasn't been any demographic modeling of catastrophic events on life expectancy.

Now there is an interesting phenomenon associated

with these events. You not only get a rapid bounce back but you also have the possibility – perhaps even likelihood – that life expectancy will be higher in subsequent years than you would ordinarily anticipate. The reason this happens, we think, is selective survival. Basically the pandemic removes weaker subgroups of the population leaving behind a more robust subgroup.

DW: You were the lead author of a special report that appeared in a 2005 issue of the New England Journal of Medicine entitled, "A Potential Decline in Life Expectancy in the United States in the 21st Century." How was this received and have there been any further developments related to this report?

JO: This report addressed the effect of obesity on longevity in the US and concluded that the steady rise in life expectancy during the past two centuries may come to an end. The initial reaction was that obesity is really not that big a deal because it is a fixable problem – all we have to do is cut our intake of calories by an extra 100 to 150 calories a day and obesity will disappear.

What has transpired since we published that article is a significant worsening of the obesity pandemic. I choose that word carefully. Epidemic has one specific meaning but a pandemic implies it is global. And indeed the obesity epidemic is global. It has grown much worse than we anticipated in 2005, and the evidence is now emerging that younger generations today in some parts of the world are likely to have shorter life expectancies than their parents' generation for the first time in the modern era.

So not only do we believe what we argued in 2005, we actually think we might have underestimated the magnitude of the obesity problem. At the time many people failed to understand the latent effects of this pandemic. But as these waves of obese people move through the age structure, it will have a negative impact on mortality rates and a dampening effect on life expectancy. We already are beginning to see it occur.

Insurance Implications

DW: While a number of our clients serve the life insurance needs of middle-income Americans, voluntary life insurance is largely bought by those with high net worth. Childhood obesity may not be as big a concern for this segment. What factors other than obesity may affect future mortality and longevity?

JO: I haven't published this yet but we've actually generated estimates of mortality rates and life

expectancy for three subgroups of the population. First we looked at the entire US population, so we could generate one set of age-specific death rates for the entire population at specific age groups. We compared these results with a subgroup of people who have 16+ years of education, and another insured for \$1+ million.

We found that those with at least 16 years of education have significantly lower death rates and higher life expectancy than the insured subgroup. The differential between the highly educated group and the total population is huge, especially at the older age groups. The insured group falls in the middle.

So if your company insures a population that is well educated and wealthy, you're right in saying that obesity and diabetes may be less of a concern for this market. In fact, I anticipate the very population you're talking about may experience more accelerated reductions in death rates and more accelerated increases in life expectancies than even the Social Security Administration is projecting.

Breakthroughs...

DW: So you foresee a widening gap between rich and poor in mortality and longevity?

JO: I expect the gap we see today will not only continue, but that it will accelerate more rapidly than has been the case over the last few decades. I can say with some confidence that we are on the verge of some new breakthroughs in the field of biomedical technology that will have a significant impact on mortality, morbidity and disability among some subgroups in the population. People who are well off will do much better than anticipated, and those who are not well off will do much worse. But like any other valuable commodity, these breakthroughs will make their way to the rest of the population much like the interventions for HIV/AIDS. This started out as interventions available, for the most part, to only those who could afford it and eventually made its way to the third world. But it took a while. I think the exact same thing will happen with interventions in slowing aging.

DW: What are these breakthroughs that the well off will be able to obtain?

JO: We'll see some reduction in mortality due to improved surgical procedures, basic advances in biomedical technology that enable us to regenerate or replace components of the body: knee joints, hip joints, specific organs. These will happen relatively rapidly but none of these interventions will have an

impact on biological aging itself. They all address the manifestation of aging.

However, I also believe there will be interventions that slow aging and that these advances will become available in enough time to influence even middle age cohorts today. In fact, I'd guess at some time in my life – I'm only 57 – I'll be taking the equivalent of a pill that will in effect slow my biological process of aging. I don't see radical life extension in the cards, but I do see an extension of a healthy life as being very likely.

I'll give you a couple of interventions that can influence the biological process of aging. One we've known about for decades is caloric restriction or reducing caloric intake. Of course we've done nothing but increase our caloric intake in the last couple of decades, but we *do* know that caloric reduction (CR) extends life and reduces the risk of a wide variety of diseases and disorders. So researchers are trying to develop CR mimetics, something that would have the same effect of CR without actually reducing caloric intake. There have been some advances in this area that are quite promising.

But the most promising line of work in my view is the study of the genetics of long-lived people. We already have people who live past 100 and are healthy and vibrant. There's evidence to suggest that these people are aging more slowly than the rest of us. And determining those genetic factors could lead to an intervention that the rest of us will take in one form or another.

... And Challenges

DW: The 45-64 age group is the core constituency for life insurers. Approximately 20 percent of deaths in the US each year are within this age group. Where is this age cohort headed?

JO: We know that people aged 55-65 in the US today are less healthy and more frail and disabled than the generation that just preceded them. We know that the generations younger than 55 are acquiring obesity at younger ages than previous generations. There is reason to believe that future generations of people who move into the 55-65 age window will do worse in terms of health, quality and duration of life than the generation you see today. So it would stand to reason that these generations will face higher risks of morbidity, disability and mortality than previous generations.

I hope that we're wrong and we're able to fix some of the problems with these younger people as they reach older age. But I'm very cautious about what to expect. I think it's a fixable problem. I just don't know if we have time.

DW: Many of our clients are interested in the risks of individuals outliving their resources. You have said that life expectancy at birth is unlikely to exceed 85 years. Could you explain why you think there's a limit?

JO: Put simply, not everyone will partake in the gains. Remember that life expectancy is an average age. Optimists basically argue that everyone will achieve these gains. It will all happen at the same time and be dramatic, and it's not far off. But they seem to ignore the deteriorating health status of younger people.

Yet here's the thing. If you eliminate heart disease, cancer and stroke, the three things that kill the vast majority of population, you can't even get to a life expectancy of 90. So how will you get up to 100 if you can't achieve 90 by eliminating three-quarters of what kills us today?

Secondly, you can't ignore the health of the living. There's no question that obesity – especially morbid obesity – dramatically and negatively affects health quality and duration of life. Both the number of people and the proportion of the population becoming obese is rising dramatically. Many experts assume that any intervention that we develop in the future will basically stop obesity or its side effects. And I believe that's unlikely.

Prospects for Future Longevity Product Investment

DW: Suppose we really do achieve recognizable increase in life expectancy. What does this mean for life insurance companies?

JO: We've seen a dramatic change in the volatility of human mortality in the past century. Mortality is much more highly predictable over short time periods – by which I mean over 5-10 years – than anything that we've seen before. When you combine that reduction in volatility with a fairly consistent and unchanging pattern in the timing of death, there's a lot to lead us to believe that investments that benefit from our understanding of longevity and mortality make perfect sense. But the dilemma that many investors face, I'll be honest, is that many of them rely on these one- and two-dimensional models for predicting the future. And therein lies the danger.

As we saw with the life settlement industry a decade ago, relying on models that are outdated or not robust enough to capture information about surviving cohorts can be a recipe for failure. However, I'm confident that investments which use three-dimensional models that account for the latency of morbidity factors among the living could lead to product development success. ∞



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