Discussant Comments
Concurrent Session 2B: Older-Age Mortality Trends

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JEAN-MARC FIX: Thank you, Ward. Well, I'm energetic, but I won't have that many comments on the papers, because I think they were all great.

The reason we like, especially in this symposium, to look at centenarians is that they're rare, and because they're rare, we think there is something special about them that makes them worth studying, and that's why we look at this. But the problem when you have a rare condition is the quality of your data is critical. I think that's what all three papers have been addressing.

Michel Poulain and his group at Université Catholique de Louvain are looking at Belgian data, and he has spent a lot of time cleaning that data. Professor Bourbeau at the Université de Montréal also spent a lot of time to clean up the Quebec data. They did so they could have good-quality data to get good conclusions; I think that is a key thing to keep in mind.

Data is scarce at age over 100, as I mentioned, and there are many problems with that data. There are people that are underreporting the number of deaths, that are overreporting their age. There is the complicating factor of migration. We've also discussed immortals that stay on your records forever; they're still always there, although you know they should have died a long time ago. This problem is more likely with social security and social security type of pension payments. You also have idiosyncrasies in each country's data, and it's really important to remember that when you do cross-country comparison. For instance, Professor Bourbeau's paper mentioned the 1976 Canadian census. If we look at the 1976 census as well as the two censuses prior and the two censuses after, the number of centenarians was, for male centenarians, 28, 65, 510 in '76, 110 and 130. It doesn't take a rocket scientist to tell that the 510 number is suspicious. So it's always important to look at the quality of your data and understand each country's idiosyncrasies. We discussed the status of birth in the 1918–1919 birth cohorts, where the uniformity of birth is definitely severely violated in many European countries due to World War I.

So those are things that are tying these papers together. And in Mr. Gbari's paper looking at the Belgian data, he has about 20 years' worth of cohorts to look at, and in those 20 years, we see no pattern in the maximum age of death and the mean age of death for the 95-plus. So in those 20 years, we don't have an evolution, and I'll contrast that with Professor Bourbeau's paper in a minute. So keeping that in mind, it's really hard to study data just looking at one value, one outlier. We have mathematical techniques to address that, and that's where extreme value theory can be

applied.

Three techniques are especially useful in this paper. The first is the use of extreme value theory, which has the advantage of not looking at the prior data. It looks only at the data that you are studying, and does not make any assumptions on the prior data in order to look at changes. The second is the comparison of the threshold methods to select the threshold age where you can assume that the general Pareto distribution applies. Finally, I think it was interesting to see the comparison of the estimation methods for the general Pareto distribution and noticing that the maximum likelihood estimators tend to be the highest of the methods that we have.

Just a little nitpicking: When the maximum threshold age was picked, the male threshold was picked using one method, and the female threshold was picked using a different method. I think it would be more logical to pick which is the best method and to apply it for both genders. A counterargument could be that there are significant and not yet fully understood differences between males and females that transpire among all the mortality data, and it might be the reason why one method works better than the other for a given gender.

Another thing that I would have liked is that, given the Rhys-Thomas threshold age method seems to be inferior to the other methods and more unstable, it would have been useful to try a different delta to see if the choice of a delta, which is a parameter for that method, had a big impact on the results or not.

Finally, I think the instability of the data is really an issue that we have to deal with over age 105. The semi-supercentenarian, the 105-plus, is today what the centenarian was maybe when the first Living to 100 Symposium started. They are still very rare and may be more special than centenarians.

Dr. Bourbeau's paper also addresses the problem that values that are based on projecting prior censuses tend to overestimate the number of centenarians. It is true in the Canadian data, as well as in the U.K. data. That is something to worry about projecting forward. It also engages us to look at why that is happening.

Professor Bourbeau's question, I think, was an interesting one: Starting in the '70s, we have seen an exponential explosion of centenarians. Why? Is it because there are more people potentially being centenarian because more people are born, or is it because of mortality

improvement? That is the question that Professor Bourbeau addresses. I think it is very interesting to notice that it is improvement from age 80 on that has such an impact on that late end of the curve. In retrospect, it is fairly understandable, but it is still an area of mortality improvement that we tend to underestimate, I believe, in our profession. There has been a lot of both health gain and mortality gain for ages 80-plus, and I think we're seeing that reflected now in that explosion of centenarians.

One of the possible explanations is that cardiovascular medicine, that affects the elderly a lot, has greatly improved and what impact that may have had. Another note that we had in both Dr. Bourbeau and Mr. Gbari's paper is that the percentage of male centenarians has dropped from maybe 30 percent initially to closer to 15 percent right about now in both Belgium and Quebec. Why is it that there is such a disparity in male and female numbers now, and why has that evolved from the past? That is not discussed in either paper. I guess that will be a question for another paper.

Finally, I recommend you get Angele Storey's full paper. I think you can get it on the Internet. Look up her name and the name of the paper. It is a pretty thick paper, but nonetheless it has a lot of interesting points in it, as Mr. Gallop points out. It originates from the desire of the statistics offices of every country to try to get a better understanding of why their data doesn't turn out like it should or how they project it. One of the points I notice that was striking to me is the number of records of year of birth for each person that most of the people in that survey had—at least five to seven records noting a year of birth in the different censuses—and how they were consistent. As we get more and more data of high quality, which as we hit the 1900s for our extinct cohort, we are now getting, we should get even better analysis.

The analysis of migration was interesting, although this is, of course, very dependent on each country. But for both Quebec and England and Wales at least, the numbers were small at ages 80-plus, which we intellectually think it is, but it's good to have that confirmed, so that helps us getting a little more confidence in the Kannisto-Thatcher method, where this is a big implied assumption.

I think the part that is most interesting in that paper—and Adrian touched on it at the end—is all the work on trying to validate Kannisto-Thatcher as a method of figuring out old-age cohorts

and how it is in general a pretty good method if things are stable.

The Kannisto-Thatcher is a commonly used model. Looking at validating how it works when you know the answer ahead of time—by having a model that you generate values with and looking at what the Kannisto-Thatcher estimate of that model would provide—was very useful. It allow you to see how good the Kannisto-Thatcher method is and where it starts having a problem. The biggest problem it has is if mortality rates by age start varying quite significantly, like at the very extreme old age.

Those were my comments. I think they were very interesting papers. I suggest that you read them. Some of the math might be a little daunting, but if you read around the math, you can still get a lot of value.

To conclude, the reason why the statistical offices, the Census Bureau and the demographers are interested in the number of centenarians is not because it is a number and it is "centenarians"; it is because of the societal impact of having a lot more centenarians, and also a lot more nonagenarians as well, and what their impact will be on society. I forgot which of our speakers mentioned intergenerational families here, but it is now not rare, or at least it's not unheard of, to have four generations under the same roof, two or three of which, being retired, taking care of each other. What will be the impact of those different households on society as a whole?

So with that thought, I leave you there, and it's time for questions.