Is Raising the Age of Eligibility Fair to all? An Investigation of Socio-Economic Differences in Mortality Using Population Data

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Abstract

Constraining the cost of pay-as-you-go financing of social security age pensions is becoming an increasingly important issue as population's age. One option, increasing the age of eligibility, raises the issue of the impact of differential mortality by socio-economic status on the fairness of such a change. Analysis using panel data may not be fully reliable due to definitional issues. Population mortality data by ethnicity is available but subdivision by socio-economic status is more problematic.

This paper draws on New Zealand research that has matched individual death records to census records. Using this research, the paper derives mortality tables by adapting New Zealand Māori and non-Māori population mortality data to reflect differences in socio-economic status. This adapted data is used as a basis to explore the implications of differential mortality in assessing the equity of increase in the pension age of eligibility.

As convergence of mortality rates over time would remove the impact of differential mortality, a brief discussion is included on the prospects for convergence, and some conditions considered necessary for this to occur described. The paper concludes with suggestions as to how the imperatives for fiscal sustainability might be tempered with actions designed to mitigate the equity shortcomings indicated by the paper's analysis.

Introduction

As the population ages, pay-as-you-go (PAYG) financing of social security age pensions will come under stress, even with increases in the proportion (let alone the number) of older people remaining in the labour force. An option frequently put forward for offsetting the projected increased cost is to increase the age of eligibility. An immediate objection is that it may bear unfairly on those of lower socio-economic status, since such status is strongly correlated to mortality, and hence this group may lose more from an increase in the age of eligibility than those from higher socio-economic groups.

It is of course not always possible to be fair to all, and pragmatic assessments of whether or not a policy option should be acted on should take into account both the likely extent of any potential unfairness and the extent to which any potential unfairness can be mitigated through other action.

The objective of this paper then is to make use of socio-economic mortality differentials derived from population-based New Zealand mortality data as a basis from which to quantify the extent of potential unfairness that may result from increasing the age of eligibility for the social security age pension.

Previous investigations into this problem have used panel data. Whitehouse and Zaidi (2008) investigated the equity of changes to the age of eligibility within the context of their Organization for Economic Co-operation and Development (OECD) paper on socio-economic differences in mortality. Their conclusion is that changes in the age of eligibility make little difference either way to the redistribution from poor to rich due to socio-economic differences in mortality. However, Monk, Turner and Zhivan (2010) come to a different conclusion looking at U.S. data,[1] and propose differential age eligibility according to household lifetime earnings to address potential unfairness.

Appropriate data is key for analysis. Whitehouse and Zaidi (2008) relied on three sets of longitudinal panel data, drawn from U.K., German and U.S. sources. Such data has the initial drawback, for mortality investigation purposes, of possibly inadequate sample size given the relatively low number of deaths until the oldest ages are reached. In addition, the analysis relied on separation of each observed sample population into three subgroups according to socio-economic status. Each subgroup, however, is unlikely to be homogeneous, and accordingly as those susceptible to high mortality are removed at relatively younger ages, there will inevitably be some degree of convergence at older ages. For example, the annuity factors for age 65 shown in Table III.1 of the paper show some continued socio-economic mortality difference for all men and for U.S. women, but results for U.K. and German women indicate that in those cases, the distinction due to division into thirds has blurred any mortality differences by age 65.[2] It is also not entirely clear from the working paper how the division into thirds was made in the three studies drawn upon, and hence how the tendency to convergence is affected.

[1] The Health and Retirement Study is a biennial panel survey of older Americans and their spouses, and has a restricted earnings data counterpart from the Social Security Administration.

[2] Whitehouse and Zaidi fully acknowledge the difficulties in working with panel data.

The use of population-based mortality data avoids these data credibility problems, but collecting socio-economic indicators longitudinally is difficult. In the United Kingdom, a 1 percent sample has been used by the Office of National Statistics for its Longitudinal Study. A report based on results from this work, Johnson (2007), provides information on trends in life expectancy by social class and shows continuing statistically significant differences in life expectancy at age 65 between manual and nonmanual workers, for both men and women. Inequality in mortality rates for men ages 25 to 64 derived from U.K. Labour Force Survey data is reported in Langford and Johnson (2010), although this does not directly shed light on what may be happening post age 65.

In New Zealand, population mortality data has been collected by ethnicity (principally Māori and non-Māori) since 1920, with life tables published by Statistics New Zealand after each five-yearly census.[3] More recently, the New Zealand Ministry of Health and the University of Otago have been carrying out a study in which death records are matched to census records (under conditions of strict confidentiality) starting from the 1980 census.[4] From the resultant datasets, a series of reports have analysed both differences by ethnicity and differences in relation to socio-economic status using census information such as income, education, car access, housing tenure, neighbourhood deprivation, labour force status and occupational class.

In the most recent study based on this data, Blakely et al. (2007), the authors report that unequal socio-economic position between ethnic groups was responsible for approximately one-third (older adults) to one-half (working age adults) of the Māori/non-Māori disparity in mortality. Further, they suggest this is likely to be an underestimate because not all dimensions of socio-economic position have been captured in the regression (although non-socio-economic factors, such as institutional racism, disparities in access to and quality of health care, and other lifestyle factors will also play some part). At one presentation based on the publication, one of the authors surmised that socio-economic factors could explain up to 75 percent of the excess mortality. This therefore presents an opportunity to analyse population mortality data by reference to socio-economic position.

3. The URL for 2005-07 is:
http://www.stats.govt.nz/browse_for_stats/population/births/new-zealand-life-tables-2005-07.aspx.
The URL for 2000-02 is:
http://www2.stats.govt.nz/domino/external/pasfull/pasfull.nsf/web/Hot+Off+The+Press+New+Zealand+Life+Tables+2000-2002?open

4 This body of work is known as the New Zealand Census-Mortality Study; for more information refer to http://www.otago.ac.nz/NZCMSWebTable/.

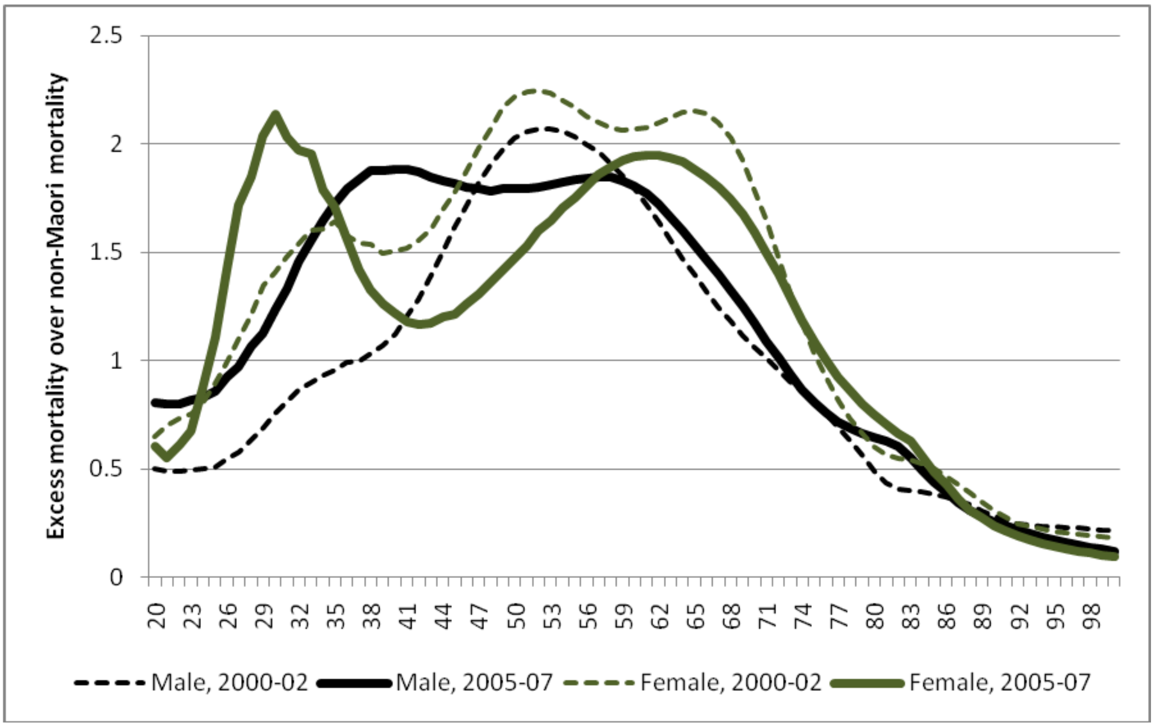
Materials and Methods

Mortality Data

New Zealand mortality data is calculated after each census using death records 18 months each side of the mid-year of the census. For example, the New Zealand Life Tables 2000–02 are based on the 2001 census and incorporate deaths from Jan. 1, 2000, to Dec. 31, 2002. Tables are produced for all males, all females, Māori males, Māori females, non-Māori males and non-Māori females. The non-Māori tables include all ethnicities other than Māori.

Comparison of the Māori/non-Māori age-specific mortality rates demonstrates large differences but also some age-related convergence effects. Figure 1 shows the excess of Māori mortality over non-Māori from the 2000–02 and 2005–07 life tables for each of males and females.

Figure 1
Excess Māori Mortality Over Non-Māori, Ages 20-100, 2000-02 and 2005-07



Source: Statistics New Zealand, author calculations.

Initially, the excess mortality is about 50- to 75-percent higher; it then peaks at over 200 percent higher in 2000–02 for both men (ages 49 to 56) and women (ages 48 to 69) and a little below 200 percent in 2005–07. The excess mortality for women in 2005–07 has a peak and then a dip at younger ages; this may not need to be given too much significance as the actual number of deaths is small at these ages. The excess mortality starts to decline at about age 60 in 2005–07; the decline begins earlier in 2000–02, if one excludes a second peak for women.

At older ages, there is a steady convergence to non-Māori rates, the excess mortality falling to less than 50 percent by around age 85. This is likely to reflect survivor bias, as those more robust within both Māori and non-Māori groupings may be more similar than those less robust. Given that the focus of this paper is on an aspect of retirement income policy, the continued albeit diminishing difference is of significance.

As noted, matching of census and death records suggests much of this excess mortality can be explained by socio-economic factors. Hence, for the purpose of this paper, two specific tables (separately for males and females) are employed. The **base** table follows the non-Māori 2005-07 life table mortality rates. This covers about 85 percent of the current New Zealand population and reflects higher-than-average socio-economic status by comparison to the Māori table, although it does include lower socio-economic non-Māori lives.

The comparator table, referred to here as the **graded** table, is derived by adding to the base table rates a proportion of the difference between the Māori and non-Māori mortality rates. The proportion taken is 75 percent of the difference between Māori and non-Māori mortality up to age 55, decreasing linearly to 50 percent of the difference from age 80 onward. These proportions have been chosen on the basis of the following considerations.

Firstly, the findings of Blakely et al. (2007) suggest minimum proportions of 50 percent up to age 65, decreasing to 33 percent for older ages. However, the authors state that they do not have all the relevant information, in particular life history, and have indicated that higher proportions may well be appropriate.

Secondly, looking at it from the other side as it were, the extent to which being Māori may affect mortality is unclear. New Zealand is unusual in that colonisation by European settlers was not accompanied by military subjugation of the indigenous inhabitants, as was the case elsewhere. Instead, a treaty was signed in 1840 between the British Crown, on one side, and the leaders of Māori iwi (tribes) on the other side, under which Māori agreed to be subjects of Queen Victoria on equal footing with settlers.[5] There has been wide intermarriage, and, importantly, Māori ethnicity is determined on the basis of self-identification, rather than descent. Arguably there is little genetic difference in Māori and non-Māori populations, at least in terms of longevity.

Nonetheless there are distinct cultural differences, and some of these may have adversely affected (and continue to affect) health outcomes. In addition, there are some physical differences (such as brown skin and dark hair), and racial prejudice occurs, even if on occasion just as lazy thinking.[6] Such prejudice may on occasion have a negative effect when Māori present for medical treatment.

[5] There are some disputes as to exactly what the treaty meant, there being arguably some discrepancies in the translation from English into Māori, but those need not concern us here.

[6] The author recalls from his student days a sociology lecturer reading out a list of stereotypes and asking the class to whom these might apply. The class response was that these would be ascribed to Māori; in actuality the stereotypes were derived from descriptions of London East End inhabitants, predominantly working class.

A third consideration is a temporal one. There has been significant urbanisation of Māori, with younger people in particular moving to cities. This suggests that ethnic differences affecting health outcomes are more likely to persist in older Māori, and hence that the ethnic element will continue to have more of a role in the disparity at older ages than in younger ages.

Taking these considerations together, ascribing all the difference between Māori and non-Māori mortality to socio-economic factors would obviously be wrong. On the other hand, it is credible that some of the unexplained difference lies in socio-economic factors not captured by the data. The proportions chosen are thus based on an informed judgment weighing up the various considerations, as a suitable best estimate for the purposes of this paper, i.e., to illustrate some particular effects of socio-economic difference.
The base and graded rates are set out in Table 1 below, with the ratio of graded rate to base rate (G/B).

TABLE 1
Mortality Rates at Five-Year Intervals

Male			
Age	Base	Graded	Ratio G/B
20	0.00094	0.00151	1.6
25	0.00084	0.00138	1.6
30	0.00079	0.00153	1.9
35	0.00094	0.00216	2.3
40	0.00122	0.00295	2.4
45	0.00175	0.00414	2.4
50	0.00268	0.00629	2.3
55	0.00430	0.01021	2.4
60	0.00696	0.01577	2.3
65	0.01164	0.02326	2.0
70	0.01974	0.03362	1.7
75	0.03435	0.04960	1.4
80	0.05932	0.07851	1.3
85	0.10444	0.12732	1.2
90	0.17632	0.19906	1.1
95	0.26246	0.28514	1.1
100	0.37218	0.39480	1.1

Female			
Age	Base	Graded	Ratio G/B
20	0.00038	0.00055	1.5
25	0.00028	0.00051	1.8
30	0.00029	0.00076	2.6
35	0.00052	0.00119	2.3
40	0.00087	0.00167	1.9
45	0.00129	0.00247	1.9
50	0.00191	0.00403	2.1
55	0.00294	0.00681	2.3
60	0.00461	0.01087	2.4
65	0.00748	0.01664	2.2
70	0.01246	0.02437	2.0
75	0.02208	0.03527	1.6
80	0.03997	0.05497	1.4
85	0.07436	0.09255	1.2
90	0.14195	0.15908	1.1
95	0.23721	0.25432	1.1
100	0.35510	0.37217	1.0

Langford and Johnson (2010) show the ratio of age-standardised mortality rates between the “Managerial and professional” and “Routine and manual” class for men 25 to 64 as 2.3 in 2008; this would appear consistent with the above table differentials for the same age range. For women 25 to 64, it will be noted the ratio is not dissimilar overall to that of men but shows greater variability by age, as may be expected by reference to Figure 1.

The life expectancy at age 65 for men differs by 2.8 years between base and graded rates, and by 3.0 years for women. The results for age 65 given in Johnson (2007) for men in 2002-05 have a difference of 4.2 between Social Class I and V, and 2.3 between Social Class II and IV. For women, the figures are 4.3 and 2.1 years respectively.

These comparisons thus suggest that the approach taken in arriving at the base and graded rates as a measure of socio-economic differences in mortality is plausible for all ages.

Mortality Improvement

The base and graded rates as presented are period mortality rates, derived from the 2005–07 experience. Statistics New Zealand, as is now common procedure, makes allowance for mortality improvement in its demographic projections. The central assumption for recent projections assumes something like an overall 1 percent per annum average decrease in mortality rates. If this is assumed for the base rates, the question then is what relationship may be appropriate to assume as between future improvement in the base (lower) rates and in the graded (higher) rates.

Technically, the same level of percentage decrease will act to lower the differential between base and graded rates, because the latter rates are higher at each age. An equal absolute reduction in mortality rates on the other hand will give rise to a greater relative improvement in the base rates compared to the graded rates, for the same reason. It follows that life expectancy differentials will increase under conditions of a future equal absolute improvement in the base and graded rates.

The summary analysis provided by Blakely et al. (2007, pp xviii-xix) states, "Mortality fell for all income groups from 1981–84 to 2001–04, however, and at much the same rate, with the result that absolute inequality remained stable while relative inequality necessarily increased over the period as a whole." They go on to note that "little further increase in relative inequality between income groups—and a possible decrease in absolute inequality—occurred from the late 1990s to the early 2000s."

Langford and Johnson (2010), albeit focusing on men ages 25 to 64, report a trend to a reduction in absolute differences from 2003 onward, but an increase in relative inequality at the same time. In other words, despite a slight narrowing of the gap in mortality rates, the relative reduction in the higher rates was still less than the relative reduction in the lower rates.

For the analysis in this paper, a no-change scenario is taken as the starting point and three improvement scenarios constructed. The four scenarios assume:

A. Period mortality rates (i.e., no change over time) continue. This could be said to represent, in some sense, the current position, and is the approach taken by Whitehouse and Zaidi (2008) and Monk, Turner and Zhivan (2010).

B.

C. Base rates decrease 1 percent per annum compound, graded rates decrease by the multiple of the age by age decrease in base rates that is required to maintain the same absolute difference in age group life expectancy calculated "now," i.e., as at the start of the projected decrease period. This scenario effectively allows for improvement in mortality in such a manner as preserves existing life expectancy differentials.

D. Both sets of rates (base and graded) decrease 1 percent per annum compound. This assumes, arguably somewhat optimistically, that relative improvement will be the same, narrowing the absolute difference.

E. Base rates decrease 1 percent per annum compound, graded rates decrease 2 percent per annum compound until they catch up with base rates and then following them. This effectively assumes substantial resource will be put into improving the health of the lower socio-economic group, and will eventually be effective in removing the socio-economic mortality gradient.

In the case of Scenario B, the absolute decrease in age-by-age mortality rates for the graded rates, in order to maintain the same relativity for life expectancy at age 65 as for the no-change position, is about 1.40 times (for both men and women) of the absolute decrease generated by a compound 1 percent per annum relative decrease in base rates. For life expectancy at 20, the multiple is again around 1.40 for men, but a little less, about 1.34, for women.

In the case of Scenario D, the catch-up between base and graded rates occurs at age 85 for those currently age 65, and at ages 71 (male) and 74 (female) for those currently age 20.

Increase in Age of Eligibility

The method used by Whitehouse and Zaidi (2008) to evaluate the effect of increasing the age of eligibility, and followed here, assumes an instant increase in age of eligibility from age 65 to age 67.[7] A comparison is then made between the value of a single life annuity at age 65 (denoted as a65) with the value at age 65 of a single life annuity deferred two years (denoted as a67|2). Clearly there will be a decrease in value as the result of the deferral; the question then is the comparability of the percentage loss as between different rates of mortality according to socio-economic status.

The OECD paper's net discount rate of 2 percent per annum for calculating annuity values has also been followed here; this implicitly assumes a use-of-money premium of 2 percent per annum over price inflation, since age pensions in nearly all jurisdictions are increased annually by at least price inflation. Arguably under PAYG financing, a lower rate could be used, but 2 percent per annum is not unreasonable for the purpose. The results are presented and discussed in the Results and Discussion section.

Effect of Socio-Economic Differences at Younger Ages

The analysis above focuses on mortality from age 65 onward. Bringing in the impact of socio-economic differences during working life allows an exploration of another of the conclusions reached by Whitehouse and Zaidi (2008), namely that socio-economic differences in mortality suggest that lower income workers should receive higher pension

[7] n practice a rise in the age of eligibility by two years is likely to be phased in over a minimum of at least two years and almost certainly rather longer.

replacement rates than high earners to avoid cross-subsidising the rich. This is investigated as follows.

- For a jurisdiction in which the age pension is a multiple of salary for each year worked, assume that the pension is expressed as a fixed multiple of salary at retirement for each year, based on a contribution of 10 percent of salary. (This is of course not the universal flat-rate pension model that applies in New Zealand, but does represent the basic principle of a contribution-based model.)
- Denote the present value of contributions of 10 percent of salary from a person currently age x as .1 x S(m) x cf(x,T,m) where m identifies socio-economic group, S is salary or wages, and cf(x,T,m) is the value of 1 per annum at age x payable for T future years using a discount of 2 percent per annum.
- Denote the value to a person now age x of a pension starting in T years time of k percent of salary or wages for each year of contribution as k x T x S(m) x af(x,T,m), where af(x,T,m) is the deferred annuity factor for a pension starting at age (x+T) applicable to a person currently age x, again using a discount of 2 percent per annum.
- For a given x and T, the actuarially fair annual benefit accrual rate k is then given by [0.1 x cf(x,T,m)]/[T x af(x,T,m].

  For the purposes of this paper, annual benefit accrual rates are firstly calculated for the case x=20 and T=45, i.e., retirement at age 65. These results are discussed and then contrasted with the results for the case x=20 and T=47, i.e., retirement at age 67.

RESULTS AND DISCUSSION

Effect of Increase in Age of Eligibility for Those Approaching Retirement

Table 2 shows the immediate effect for someone age 65 of a move in the age of eligibility to 67 from 65.

TABLE 2
Effect of Increase in Age of Eligibility From 65 to 67

	Male		**Female**	
	Base	**Graded**	**Base**	**Graded**
Scenario A: period mortality				
a65	14.817	12.815	16.659	14.566
a67|2	12.880	10.900	14.713	12.638
Differential	13.1%	14.9%	11.7%	13.2%
Mortality effect		1.9%		1.6%
Scenario B: base mortality decrease 1% per annum, absolute difference in life expectancy at 65 stays same				
a65	15.488	13.496	17.370	15.284
a67|2	13.551	11.581	15.424	13.356
Differential	12.5%	14.2%	11.2%	12.6%
Mortality effect		1.7%		1.4%
Scenario C: mortality decrease 1% per annum				
a65	15.488	13.420	17.370	15.241
a67|2	13.551	11.505	15.424	13.313
Differential	12.5%	14.3%	11.2%	12.7%
Mortality effect		1.8%		1.4%
Scenario D: base mortality decrease 1% per annum, graded mortality decrease 2% per annum until converges				
a65	15.488	13.974	17.370	15.800
a67|2	13.551	12.059	15.424	13.872
Differential	12.5%	13.7%	11.2%	12.2%
Mortality effect		1.2%		1.0%

Scenario A demonstrates how the delay of two years for receipt of a pension clearly impacts more in terms of those subject to lower socio-economic mortality than those subject to the base mortality, for both sexes. The loss from moving the age of eligibility for the higher socio-economic group represented by base rates is less by nearly two percentage points (1.9 percent, 1.6 percent for males and females respectively). This result is suggestive that the Whitehouse and Zaidi (2008) conclusion that extending the age of eligibility does not increase unfairness may be an artifact of the particular panel studies used, and hence potentially unreliable for policy purposes.

Where improvement in longevity results in preservation of the absolute difference in life expectancy, i.e., Scenario B, or is the same in relative terms, i.e., Scenario C, then the result remains broadly the same. The differences are marginally less, a little more so where life expectancy differences remain the same than for constant relative improvement, but potential unfairness remains.

Where modeling assumes the lower socio-economic group has a greater rate of improvement, i.e., Scenario D, then the difference is reduced by nearly a half compared to Scenario A, although they are still by no means eliminated.

Actuarially Fair Annual Benefit Accrual Rates

Turning to people currently age 20, the calculation of actuarially fair annual benefit accrual rates by socio-economic difference confirms the Whitehouse and Zaidi (2008) finding.

TABLE 3
Rate of Annual Benefit Accrual, Age 20, Retirement Age 65

	Male		Female	
	Base	**Graded**	**Base**	**Graded**
Scenario A: period mortality				
cf (20,45)	29.039	28.253	29.355	28.908
af(20,45)	5.383	4.009	6.319	5.019
Annual benefit accrual	1.20%	1.57% (+31%)	1.03%	1.28% (+24%)
Scenario B: base mortality decrease 1% per annum, absolute difference in life expectancy at 20 stays same				
cf (20,45)	29.165	28.416	29.438	29.016
af(20,45)	6.701	5.322	7.550	6.255
Annual benefit accrual	0.97%	1.19% (+23%)	0.87%	1.03% (+19%)
Scenario C: mortality decrease 1% per annum				
cf (20,45)	29.165	28.520	29.438	29.082
af(20,45)	6.701	5.412	7.550	6.422
Annual benefit accrual	0.97%	1.17% (+21%)	0.87%	1.01% (+16%)
Scenario D: base mortality decrease 1% per annum, graded mortality decrease 2% per annum until converges				
cf (20,45)	29.165	28.731	29.438	29.215
af(20,45)	6.701	6.303	7.550	7.232
Annual benefit accrual	0.97%	1.01% (+5%)	0.87%	0.90% (+4%)

In the period mortality case, Scenario A, the actuarially fair annual benefit accrual for the higher socio-economic group males is 1.20 percent, but to compensate the lower socio-economic group an accrual rate of 1.57 percent is needed, about 31 percent more. The same difference shows up for females, 1.03 percent and 1.28 percent, about 24 percent more. (Note that the female annual benefit accrual rates are naturally lower than male equivalents as a result of lower overall female mortality compared to males.)

Allowing for decreasing mortality under scenarios B, C and D leads to a reduction in all annual benefit accrual rates, as expected since pensions are payable for longer. For scenarios B and C, the higher rate needed for actuarial fairness for the lower socio-economic group is about 21- to 23-percent higher for males and 16- to 19-percent for females.

Assuming longevity improvement plus convergence, Scenario D, removes much of the difference in outcomes. The higher rate needed for the lower socio-economic group is just 5 percent higher for males and 4 percent higher for females. This reflects, as much as anything, the impact that convergence has, since from a little more than age 70 the mortality rates are, in this scenario, the same for both socio-economic groups.

Effect on Annual Benefit Accrual Rate of Increase in Age of Eligibility

Applying the same approach to retirement at age 67, in place of age 65, gives the results set out in Table 4 below.

TABLE 4
Rate of Annual Benefit Accrual, Age 20, Retirement Age 67

	Male		Female	
	Base	**Graded**	**Base**	**Graded**
Scenario A: period mortality				
cf (20,47)	29.743	28.852	30.093	29.573
af(20,47)	4.679	3.410	5.580	4.355
Annual benefit accrual	1.35%	1.80% (+33%)	1.15%	1.44% (+26%)
Scenario B: base mortality decrease 1% per annum, absolute difference in life expectancy at 20 stays same				
cf (20,47)	29.896	29.047	30.195	29.703
af(20,47)	5.970	4.690	6.793	5.568
Annual benefit accrual	1.07%	1.32% (+ 24%)	0.95%	1.14% (+ 20%)
Scenario C: mortality decrease 1% pa				
cf (20,47)	29.896	29.172	30.195	29.784
af(20,47)	5.970	4.761	6.793	5.719
Annual benefit accrual	1.07%	1.30% (+ 22%)	0.95%	1.11% (+ 17%)
Scenario D: base mortality decrease 1% per annum, graded mortality decrease 2% per annum until converges				
cf (20,47)	29.896	29.422	30.195	29.946
af(20,47)	5.970	5.612	6.793	6.501
Annual benefit accrual	1.07%	1.12% (+ 5%)	0.95%	0.98% (+4%)

A similar pattern obtains according to socio-economic mortality differences as in the age 65 age-of-retirement case: The percentage extra annual benefit accrual rate required for actuarial fairness as between socio-economic groups is of the same general order as shown in Table 3 for all four scenarios.

Compared to the age 65 case, the extension of the age of eligibility to 67 increases the annual benefit accrual rate appropriate for actuarial balance, as the result of a longer expected accrual period and a shorter expected benefit payment period. For the male higher socio-economic group under Scenario A, the accrual rate can increase by 13 percent compared to Table 3, while for the lower socio-economic group it can increase by 15 percent, indicating again that an increase in the eligibility age will weigh more heavily on the higher mortality group if accrual rates are not adjusted. For females, the relative increases are 11 percent and 13 percent, again a difference of two percentage points.

The two percentage points of difference for Scenario A falls to around one percentage point for scenarios B and C: The impact of the assumed levels of decrease in mortality narrows the difference appreciably when one starts from age 20. For Scenario D, there is no discernible difference.

Convergence

The results set out above support an argument that increasing the age of eligibility for the age pension will have a disproportionate effect on those with lower average longevity, as characterized by those in the lower socio-economic group. It also shows however that some effects may be partially mitigated if ongoing improvement in longevity, as measured by the relative rate of decline in mortality rates, is at least the same for the whole population or at least such as to preserve absolute differences in life expectancy, and considerably mitigated (over time) if the rate of decline is higher for the lower socio-economic group.

Although future convergence of mortality rates—or, to put it another way, less diversity in mortality rates by identifiable characteristics relating to socio-economic group—would defuse the issue of unfairness in extending the age of eligibility in the longer term, it may not in fact be easily achieved. Blakely et al. (2007) comment that:

> "The key finding of this latest report is that both ethnic and socio-economic inequalities in mortality may no longer be widening, as they have done ever since the mid 1980s. However, before we can be certain that there has been a recent change in trend, at least one further datapoint will be necessary (i.e., for 2006-09).
>
> This pattern of a recent stabilization or narrowing in mortality inequalities (from 1996-99 to 2001-04) does not apply to all groups. For example, low income young adults have shown no reduction in mortality over the whole period (from 1981-2004), while their high income counterparts have shown a steady improvement, leading to a continuous widening of income inequality in mortality among young adults."

It seems unlikely that material disparities in income will disappear; the argument that labour market incentives are essential for economic efficiency seems likely to prevail. It follows that if differences in income automatically lead to differences in the quality of health treatment and in health outcomes, then labour market differentials will automatically lock in mortality differences without other action.

Some aspects of mortality differentials in any case look difficult to remove. Institutional racism has been mentioned as an issue for New Zealand, e.g., possible different medical treatment being offered to those presenting based on ethnicity and not on medical condition. More generally, differences in mortality result from complex factors at different levels.

Nonetheless, it may be that part of the problem of discriminating by socio-economic group in increasing the age of eligibility could be mitigated by effective and focused action to improve health outcomes for the higher mortality groups, regardless of labour market policies. Any increase in pension eligibility age as the result of the fiscal pressure brought about by the aging of the population should—on this view—be accompanied by appreciable investment in preventative health measures targeted at lower socio-economic groups and by increased efforts made to address factors that bear more on lower socio-economic groups (such as institutional racism, use of tobacco, etc.), in conjunction with specific programs put in place to monitor comparative rates of mortality decline.

Conclusions

As noted at the beginning, the aging of populations in conjunction with PAYG financing of age pensions (and other expenditure, notably health) will place a strain on country finances. Encouraging older people to remain in work can only go so far in addressing this issue. It is therefore not surprising that policymakers look to extending the age of eligibility for age pension as a cost-control mechanism.

Using population data that has a close—although by no means complete—connection to socio-economic status shows extending the age of eligibility for an age pension will have a significantly greater adverse effect on those with low socio-economic status. Furthermore, these results hold under arguably optimistic assumptions as to future movement in mortality rates. Only in the case of eventual convergence is there any reduction in the unfairness, and the literature discussed here (Blakely et al. 2007; Johnson 2010) is not particularly hopeful in this regard.

The need to pay additional attention to improving health outcomes for the lower socio-economic group is therefore clear, as one way of mitigating the unfairness introduced in increasing pension eligibility age in conditions of social inequality. Given however that health expenditure is also under population aging pressures, the window for investment in preventative health measures could be said to be closing rather rapidly.

One should not in any case overlook those groups in the community who have suffered ill-health as the result of adverse workplace conditions. A New Zealand example of this is timber-workers who were exposed to Pentachlorophenol, a wood preservative, before it was found to be harmful and its use banned from 1988. People who come into this category should arguably be exempt from any rise in the age of eligibility. More generally, being able to find viable paid employment may be more difficult for those in the lower socio-economic groups, accentuating the demographic effects set out above.

There are however general ways in which to mitigate the adverse effects to the lower socio-economic group of extending the age of eligibility. Examples include enhanced unemployment benefit post the “old” eligibility age and, indeed, rather than changing the eligibility age, introduction of means-testing for a fixed period instead.

The results presented here also demonstrate that under age pension systems where the pension depends on lifetime earnings, some degree of “flattening” pension outcomes is actuarially fair given the connection between socio-economic group and mortality. The extent of the flattening needed is dependent on the actual difference in mortality, which may not be straightforward to establish, but clearly should be attempted.

Finally, given the advantages of narrowing the gap in mortality rates, policy interventions in health (and other areas) that compensate for income-related outcomes would appear desirable if increasing the age of eligibility is not to further exacerbate differences in labour market outcomes.

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Citations

Blakely, T., M. Tobias, J. Atkinson, L-C. Yeh, and K. Huang. 2007. "Tracking Disparity: Trends in Ethnic and Socioeconomic Inequalities in Mortality, 1981-2004." *Public Health Intelligence Occasional Bulletin,* no. 38. Wellington: New Zealand Ministry of Health.

Johnson, Brian. 2007. "Trends in Life Expectancy by Social Class 1972-2005." United Kingdom: Office for National Statistics.

Langford, Ann, and Brian Johnson. 2010. "Trends in Social Inequalities in Male Mortality, 2001-08: Intercensal Estimates for England and Wales." *Health Statistics Quarterly* 47. United Kingdom: Office for National Statistics.

Monk, Courtney., John A. Turner, and Natalia A. Zhivan. 2010. "Adjusting Social Security for Increasing Life Expectancy: Effects on Progressivity." Working Paper 2010-9. Boston: Center for Retirement Research.

Whitehouse, Edward R., and Asghar Zaidi. 2008. "Socio-economic Differences in Mortality: Implications for Pensions Policy." *OECD Social, Employment and Migration Working Papers,* no. 71. Paris: OECD.