

Do cohort mortality trends emigrate?

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October 2009

Research questions

1. Does NZ have similar mortality patterns to E&W, especially at older ages?
2. Did the mortality advantages of UK's golden cohort migrate to NZ?
3. What does the NZ/UK mortality mirror tell us about cohort mortality trends and projections?

Key facts UK, NZ

	Total population	Ethnicity	% born overseas	Period e_0
	Mid 2007	2001 UK, 2006 NZ		2005-7
UK	61 m 54 m E&W	92% "White"	8%	M: 77.4 F: 81.7 (E&W)
NZ	4.2 m	79% European 15% Māori 9% Asian 7% Pacific Can choose more than one ethnicity	23%	M: 78.0 F: 82.2

Source: ONS and Statistics New Zealand

UK migrants to NZ

- Dominant source country historically; still significant
- Largest birth country of overseas-born residents (6% of total population)
- 13% of NZ deaths born in UK
- Nearly all NZ residents born in UK of golden cohort ages have been in NZ for 30+ years; over half for 40+ years

Mortality forecasting: “Projections”

Annual rate of change in the
mortality rate = $1 - q_{x,t}/q_{x,t-1}$

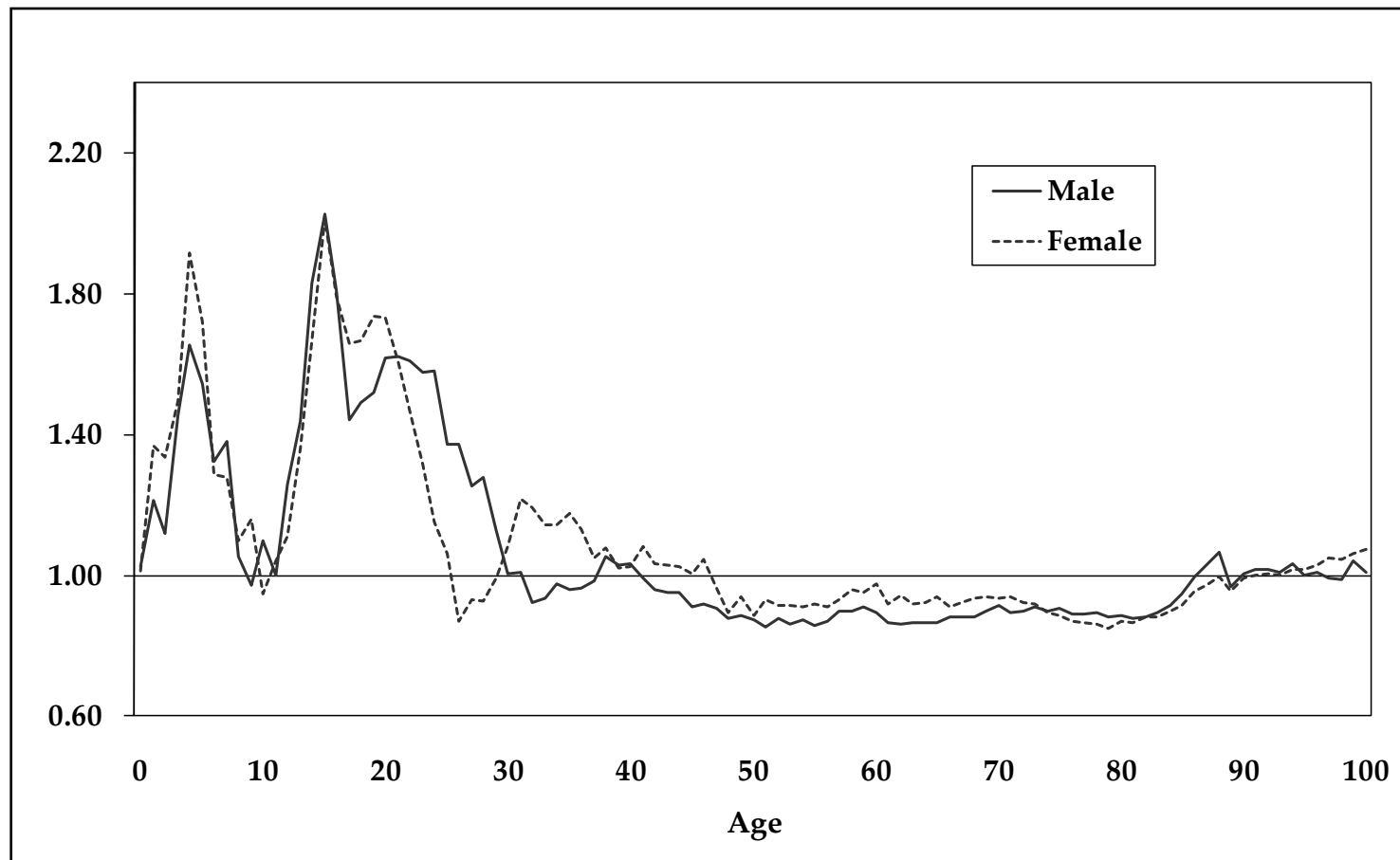
Principal projection assumptions	Average 2006-2031	Average 2032-2061
England & Wales	Varies by age; averages to 2.1%	1% except golden cohort up to 2.5%
New Zealand	1.6% for all ages	0.6% for all ages

Source: 2006-based projections, ONS and Statistics New Zealand

Research questions

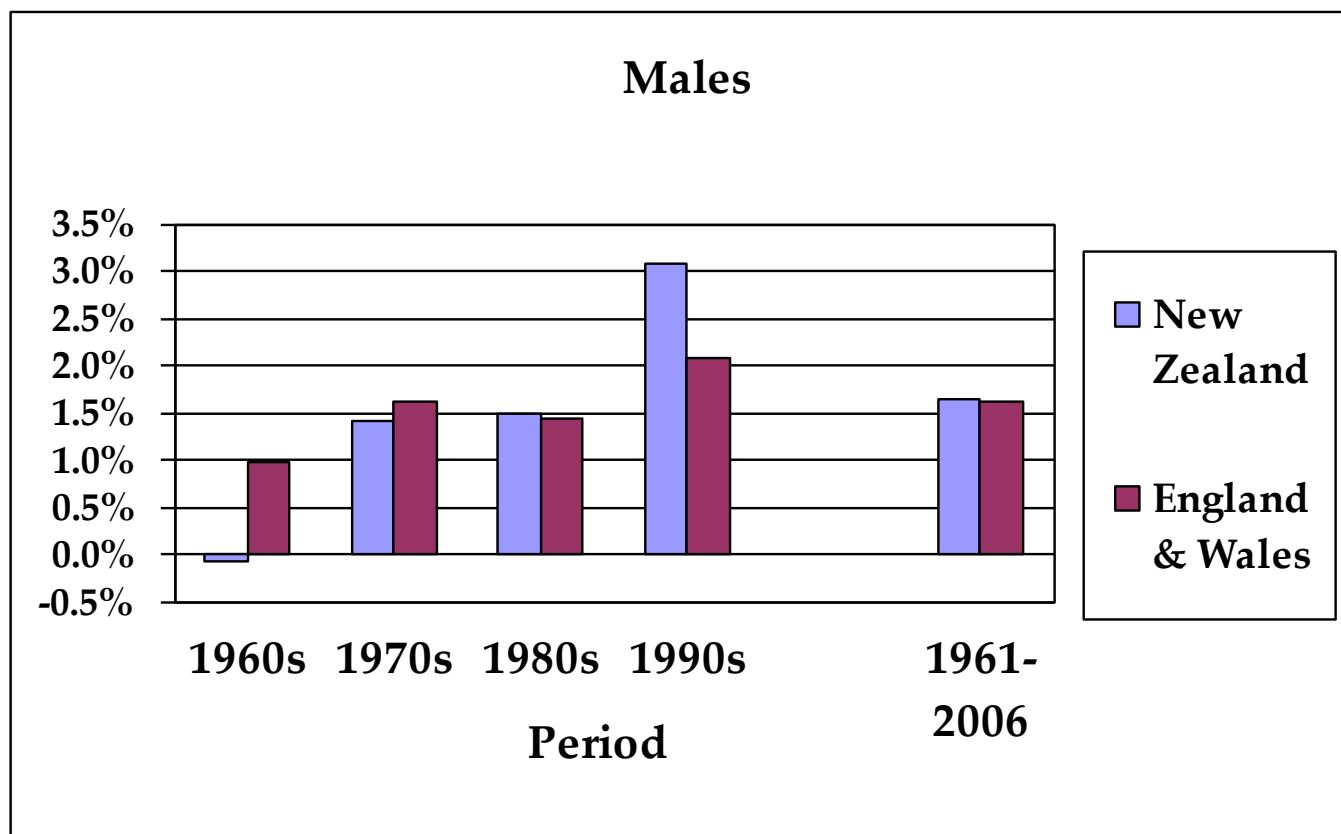
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q_x NZ as ratio to E&W



Source: Period life tables 2005-7, ONS and Statistics New Zealand

Average annual rate of all-ages mortality improvement: males



Source: Calculated from period q_x , ONS and Statistics New Zealand

England & Wales average annual rate of mortality improvement: The golden cohort

Shading:
Cell value
exceeds average
plus 1 SD for
that time period
(ages 20+ only)

Males						Females					
Age	1961-71	1971-81	1981-91	1991-2001	1996-2006	1961-71	1971-81	1981-91	1991-2001	1996-2006	
0	2.5%	3.9%	3.1%	4.0%	3.4%	2.3%	3.7%	3.3%	3.2%	1.4%	
5	0.8%	4.6%	2.7%	6.0%	1.4%	1.1%	3.8%	2.0%	2.5%	2.1%	
10	0.6%	2.5%	2.2%	2.3%	1.9%	0.4%	2.0%	2.6%	3.7%	1.0%	
15	0.3%	1.3%	1.0%	3.1%	2.7%	0.1%	1.8%	1.2%	1.5%	2.5%	
20	1.7%	1.2%	-0.7%	1.0%	2.3%	1.8%	1.9%	0.5%	1.0%	2.2%	
25	1.8%	0.5%	-0.5%	-0.5%	1.5%	1.6%	1.2%	1.7%	0.0%	1.4%	
30	1.4%	1.4%	-0.7%	-0.8%	0.9%	1.7%	2.2%	1.3%	0.4%	2.0%	
35	1.3%	2.1%	-0.7%	0.7%	0.5%	1.6%	2.1%	1.2%	0.3%	1.4%	
40	0.3%	2.1%	1.5%	0.8%	1.2%	0.9%	2.0%	2.6%	0.4%	1.4%	
45	0.0%	2.1%	2.4%	0.9%	1.2%	0.0%	2.0%	2.3%	1.2%	1.0%	
50	0.2%	1.5%	2.8%	2.2%	1.2%	0.2%	1.2%	2.6%	1.3%	1.5%	
55	1.1%	0.8%	3.2%	2.6%	2.4%	0.3%	0.4%	2.4%	2.0%	2.0%	
60	1.2%	1.2%	2.4%	3.1%	3.0%	1.2%	0.4%	1.3%	2.7%	2.3%	
65	0.7%	1.4%	1.6%	3.6%	3.7%	1.5%	0.7%	0.7%	2.9%	3.1%	
70	0.5%	1.1%	1.7%	2.9%	4.0%	1.7%	1.1%	1.0%	2.1%	3.2%	
75	0.8%	0.7%	1.6%	2.2%	3.2%	1.7%	1.3%	1.3%	1.5%	2.4%	
80	1.0%	0.3%	1.3%	2.1%	2.6%	1.8%	0.8%	1.5%	1.4%	2.0%	
85	1.2%	0.2%	1.1%	1.2%	2.4%	1.4%	0.6%	1.5%	0.9%	1.7%	

Source: Calculated from period q_x , ONS

New Zealand average annual rate of mortality improvement: A golden cohort?

Shading:
Cell value
exceeds average
plus 1 SD for
that time period
(ages 20+ only)

Males						Females					
Age	1961-71	1971-81	1981-91	1991-2001	1996-2006	1961-71	1971-81	1981-91	1991-2001	1996-2006	
0	2.4%	2.9%	2.6%	4.6%	3.2%	2.3%	2.5%	5.3%	1.6%	2.2%	
5	1.6%	2.7%	2.7%	5.1%	3.7%	1.4%	3.9%	0.5%	3.7%	3.3%	
10	1.5%	3.4%	-0.1%	3.3%	2.2%	0.9%	2.6%	3.3%	0.9%	3.7%	
15	-2.7%	1.2%	0.3%	3.5%	4.4%	-1.5%	-0.4%	2.0%	3.8%	2.9%	
20	-1.0%	-0.8%	-0.9%	5.0%	3.7%	-0.3%	-1.3%	1.8%	2.8%	4.1%	
25	0.2%	-0.9%	-0.3%	2.3%	3.5%	0.9%	0.7%	1.1%	1.4%	4.9%	
30	0.2%	1.1%	0.0%	1.2%	3.0%	0.7%	2.0%	1.1%	2.0%	1.5%	
35	-0.4%	2.4%	0.1%	2.4%	1.0%	0.7%	2.7%	1.3%	2.9%	1.1%	
40	-0.6%	2.1%	2.2%	1.9%	0.6%	-0.5%	2.1%	2.1%	3.0%	1.0%	
45	0.0%	1.5%	2.7%	2.9%	1.9%	-0.6%	0.6%	2.9%	3.3%	2.1%	
50	-0.4%	2.0%	2.3%	3.6%	3.0%	-0.2%	1.3%	1.2%	3.6%	3.3%	
55	-0.7%	1.5%	2.7%	3.9%	3.8%	0.4%	0.6%	1.8%	2.8%	3.5%	
60	-0.4%	1.5%	2.8%	3.5%	4.1%	0.5%	1.2%	1.7%	2.1%	3.2%	
65	-0.5%	1.2%	2.5%	3.3%	4.1%	0.3%	0.7%	2.4%	2.2%	2.9%	
70	-0.3%	1.0%	2.1%	2.8%	3.8%	0.7%	1.3%	1.9%	2.6%	2.6%	
75	-0.4%	0.9%	2.0%	2.5%	3.2%	0.9%	1.9%	1.9%	2.1%	2.5%	
80	-0.1%	0.9%	1.3%	2.4%	2.8%	0.9%	1.8%	1.5%	2.1%	2.1%	
85	0.2%	0.8%	1.8%	1.0%	1.8%	0.4%	2.4%	1.3%	1.3%	1.5%	

Source: Calculated from period q_x Statistics New Zealand

Recent rate of mortality improvement: mostly higher in NZ, 1996-2006

Age	Males		Females	
	NZ	E&W	NZ	E&W
0	3.2%	3.4%	2.2%	1.4%
5	3.7%	1.4%	3.3%	2.1%
10	2.2%	1.9%	3.7%	1.0%
15	4.4%	2.7%	2.9%	2.5%
20	3.7%	2.3%	4.1%	2.2%
25	3.5%	1.5%	4.9%	1.4%
30	3.0%	0.9%	1.5%	2.0%
35	1.0%	0.5%	1.1%	1.4%
40	0.6%	1.2%	1.0%	1.4%
45	1.9%	1.2%	2.1%	1.0%
50	3.0%	1.2%	3.3%	1.5%
55	3.8%	2.4%	3.5%	2.0%
60	4.1%	3.0%	3.2%	2.3%
65	4.1%	3.7%	2.9%	3.1%
70	3.8%	4.0%	2.6%	3.2%
75	3.2%	3.2%	2.5%	2.4%
80	2.8%	2.6%	2.1%	2.0%
85	1.8%	2.4%	1.5%	1.7%

Source: Calculated from period q_x , ONS and Statistics New Zealand

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UK migrants have better mortality

SMRs to estimated resident total New Zealand population

	Males				Females			
	1990-2	1995-7	2000-2	2005-7	1990-2	1995-7	2000-2	2005-7
New Zealand born								
SMR	105	105	106	108	104	104	104	105
CI lower	104	104	105	106	103	103	103	104
CI upper	106	106	107	109	105	105	105	107
United Kingdom born								
SMR	95	93	94	92	94	96	95	95
CI lower	92	91	91	89	92	94	92	92
CI upper	97	96	96	94	97	99	97	97
Other overseas born								
SMR	103	96	97	94	105	96	100	94
CI lower	100	93	94	91	101	93	97	91
CI upper	107	99	100	97	109	100	103	96

Source: Calculated from Statistics New Zealand data

UK migrants have better mortality

SMRs to estimated resident total New Zealand population, 2005-7

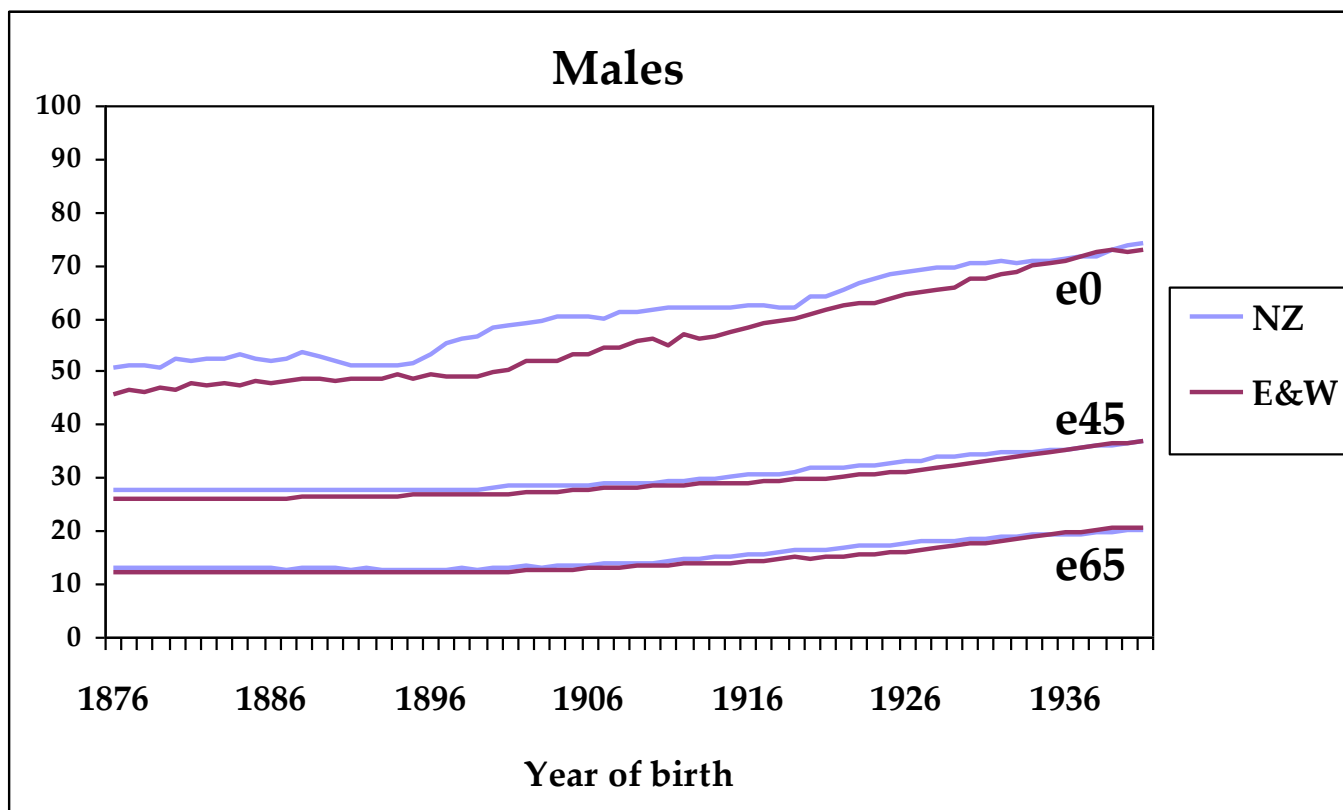
	Males				Females			
	All Māori	All non-Māori	NZ born non-Māori	UK born	All Māori	All non-Māori	NZ born non-Māori	UK born
All ages	193 *	94 *	100	92 *	193 *	95 *	100	95 *
0-34	165 *	84 *	95	<i>n/a</i>	168 *	81 *	90 *	<i>n/a</i>
35-59	233 *	85 *	90 *	76 *	212 *	86 *	94 *	73 *
60-84	196 *	95 *	101	91 *	214 *	94 *	99	88 *
85+	103	100	105 *	101	112	100	102 *	104

Source: Calculated from Statistics New Zealand data

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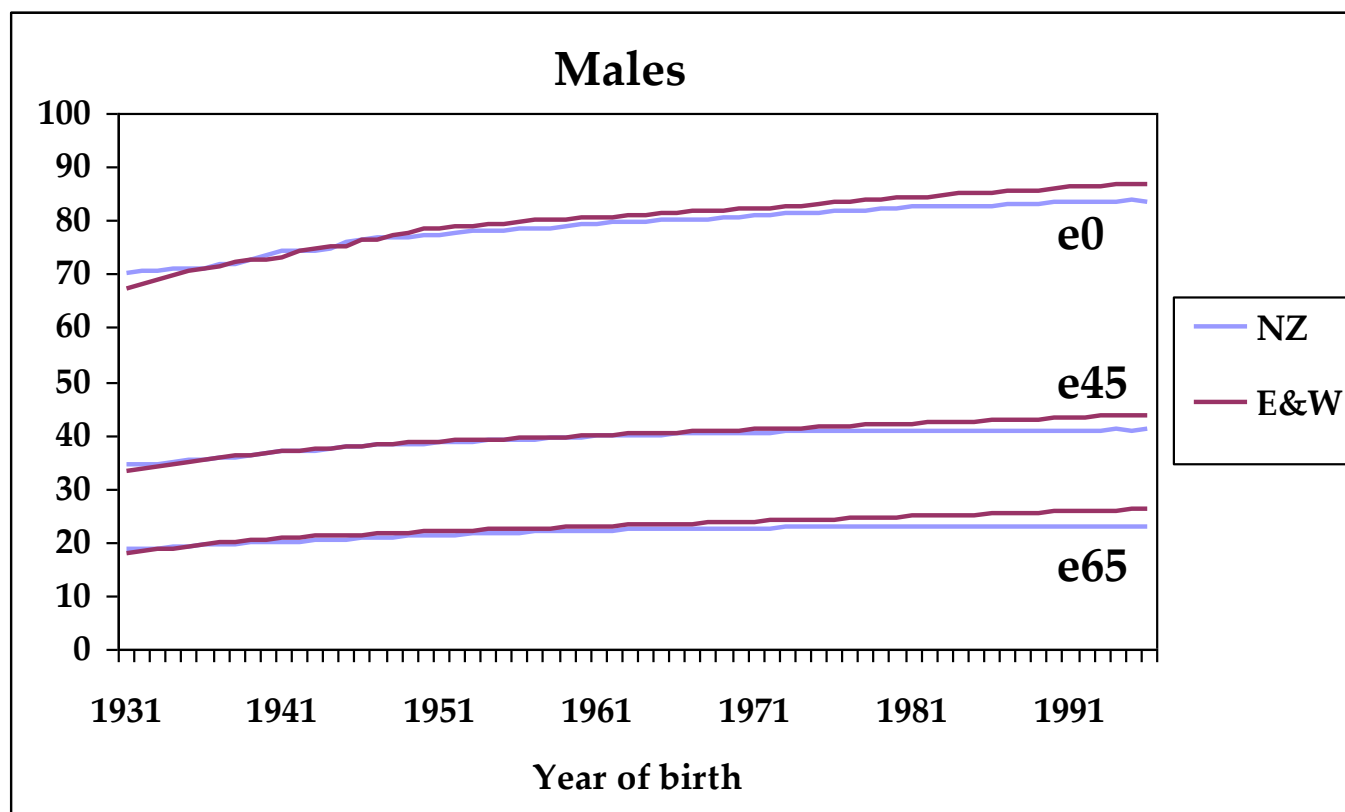
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Cohort life expectancies: history



Source: Cohort tables, ONS and Statistics New Zealand

Cohort life expectancies: projected



Source: Cohort tables, ONS and Statistics New Zealand

Some answers, and more questions

1. Does NZ have similar mortality patterns to E&W, especially at older ages?
 - Yes, but higher accident mortality at young ages, and faster recent improvements.
2. Did the mortality advantages of UK's golden cohort migrate to NZ?
 - Possibly. Effect may be masked by NZ healthier environment at middle to older ages.
 - Mortality of UK migrants to NZ appears to be a special case of non-convergence to host country.

Some answers, and more questions

3. What does the NZ/UK mortality mirror tell us about cohort mortality trends and projections?
 - Data consistent with ante-natal and early life explanation for golden cohort.
 - NZ appears to have age-related mortality improvement trends and a golden cohort: how to reflect in projections?

Some answers, and more questions

3. What does the NZ/UK mortality mirror tell us about cohort mortality trends and projections?
 - Can birth country be useful for mortality projections?
 - Mortality is improving faster in NZ than UK: why? Are relative optimism of UK projections and relative pessimism of NZ projections mutually consistent?