Changes in Diabetes prevalence: Decreasing mortality or Increasing incidence?

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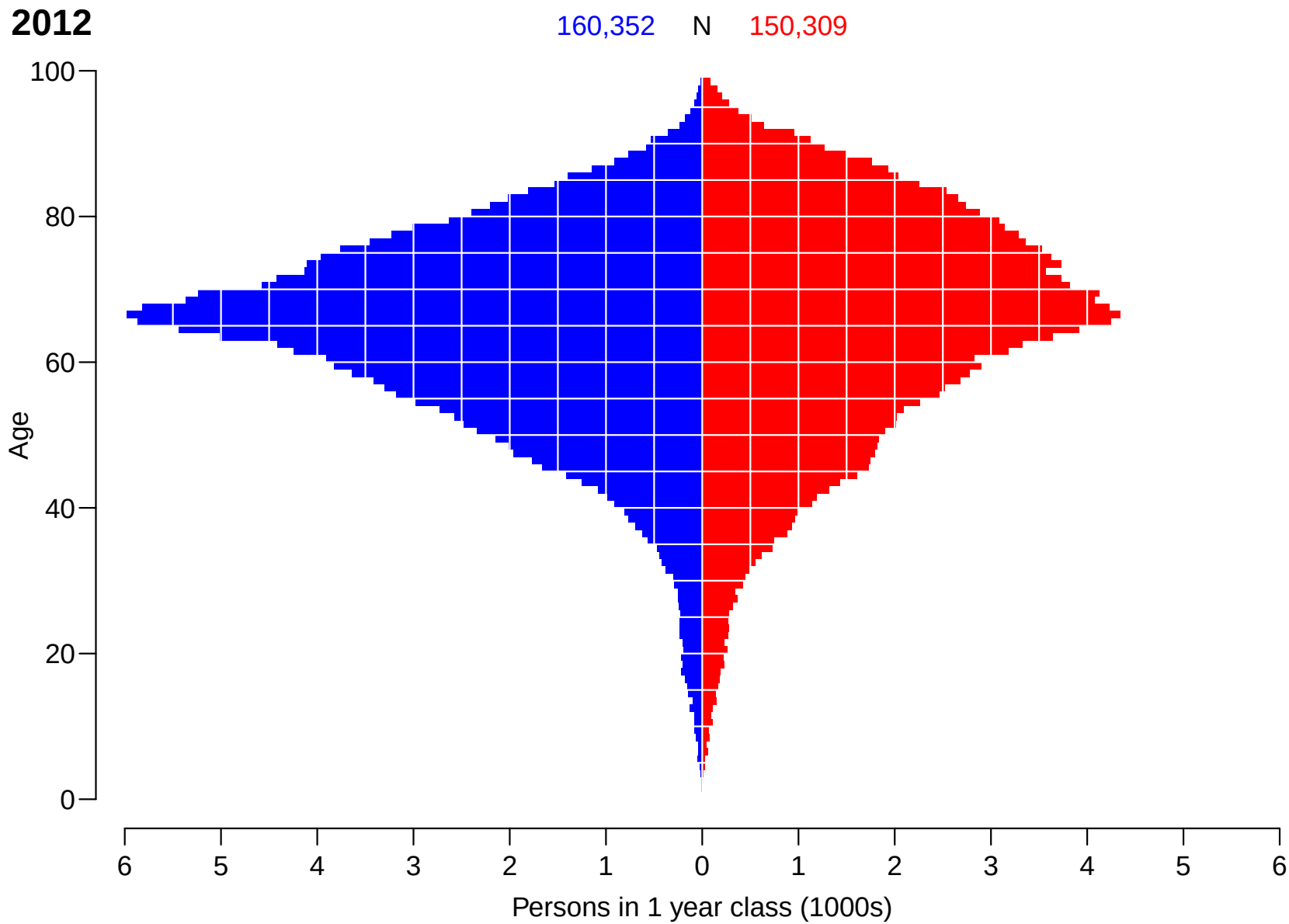
ECE
Århus, August 2013

http://BendixCarstensen.com/DMreg/Prevalence

DM patients in Denmark, 2012



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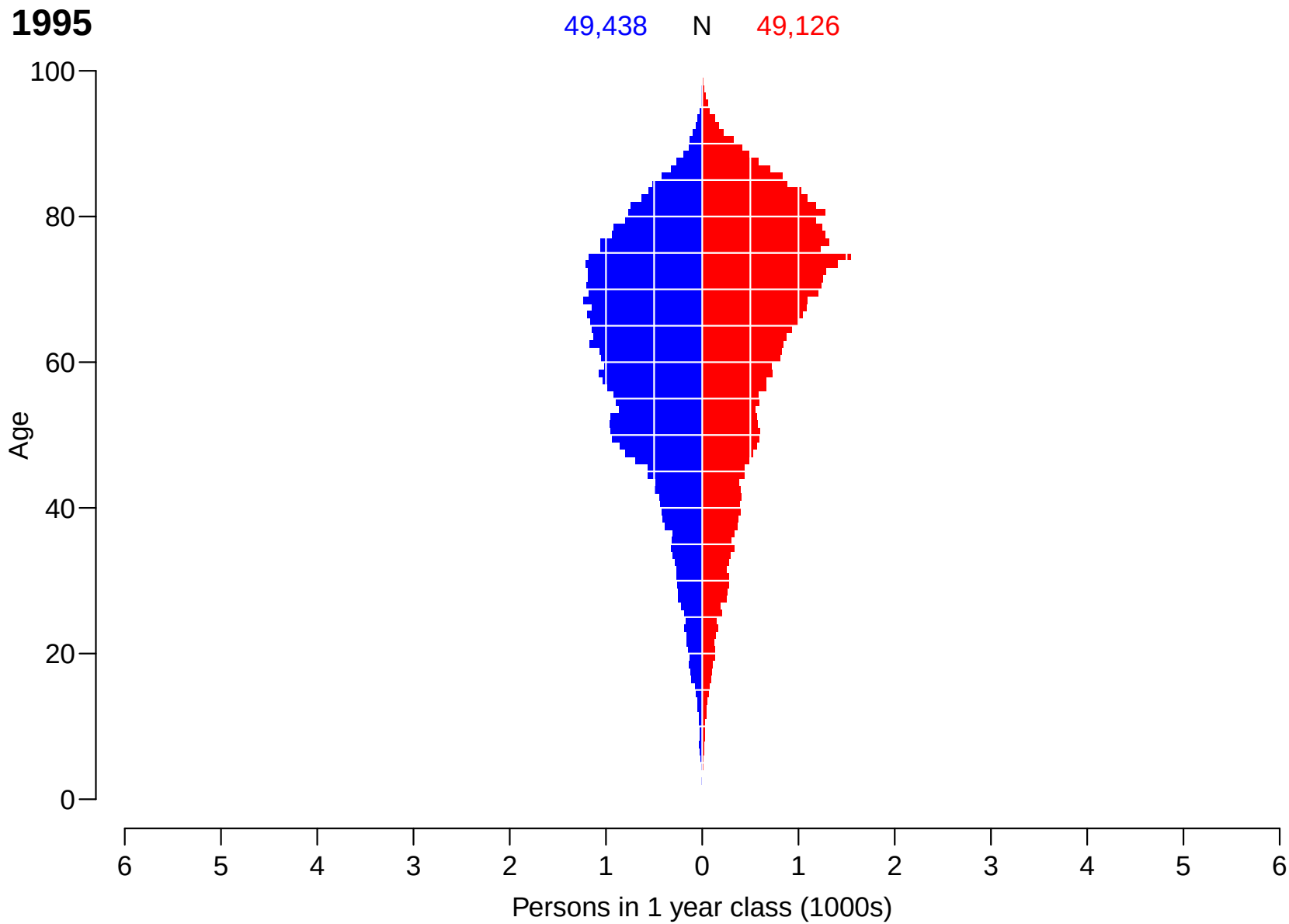

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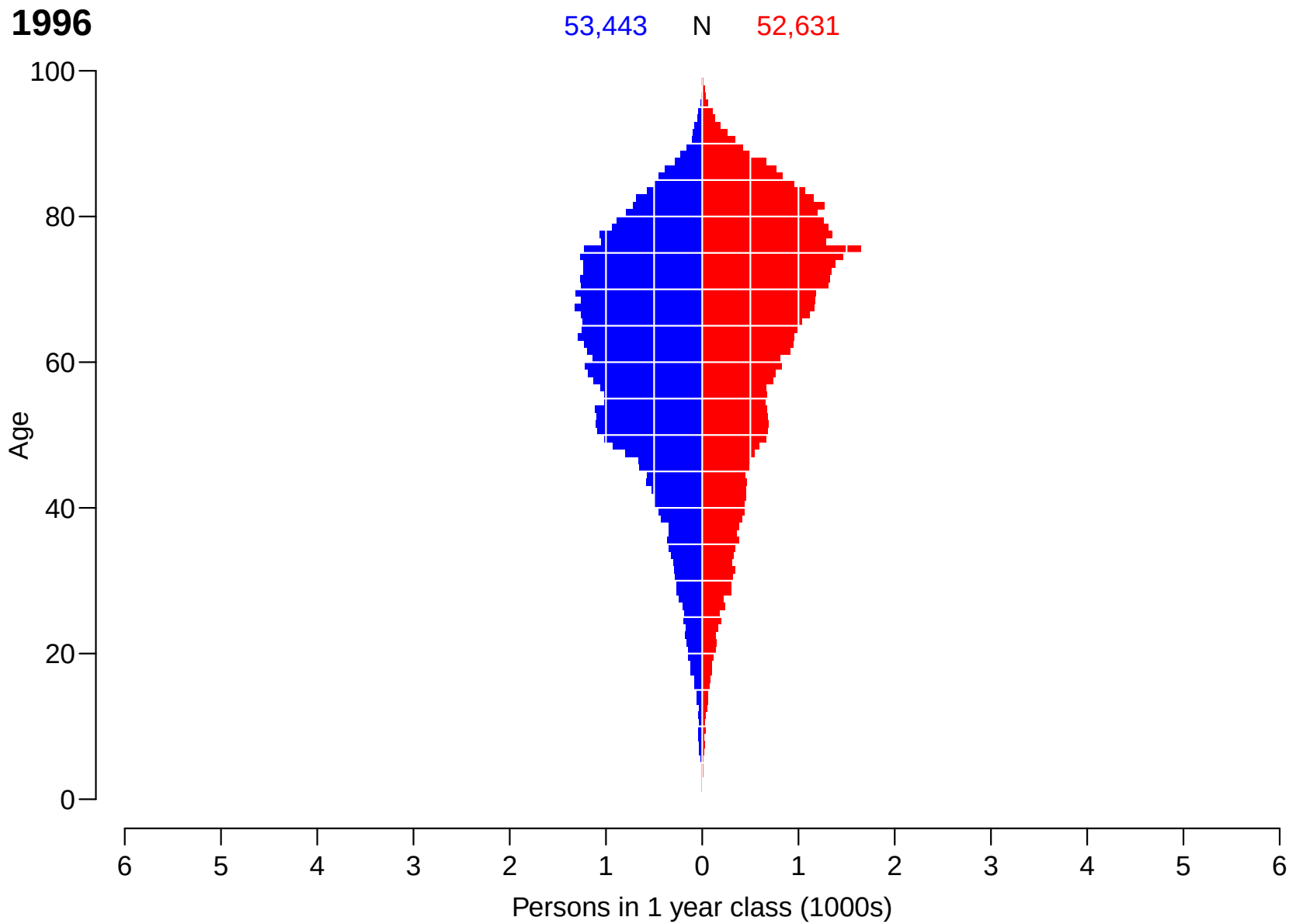

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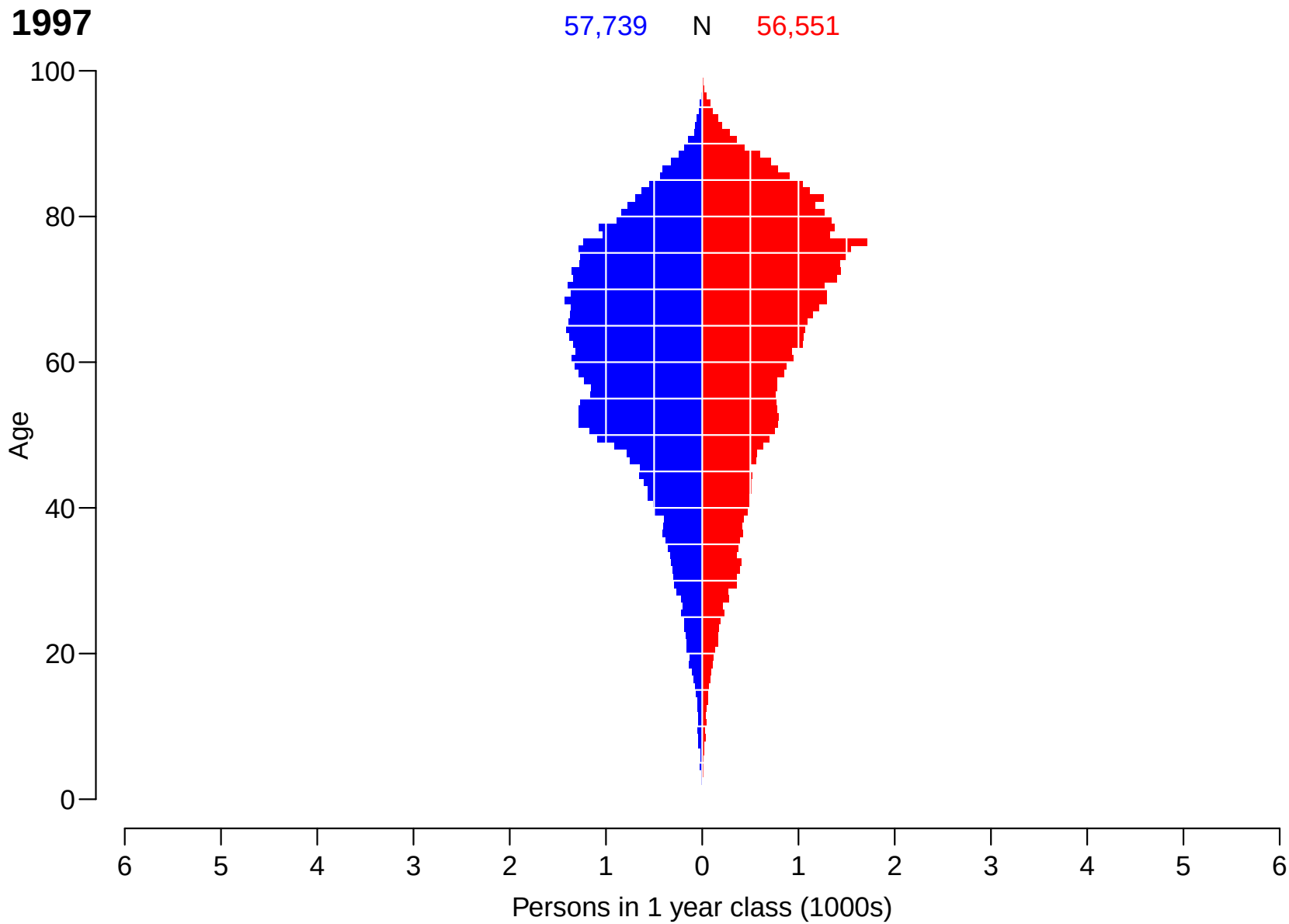

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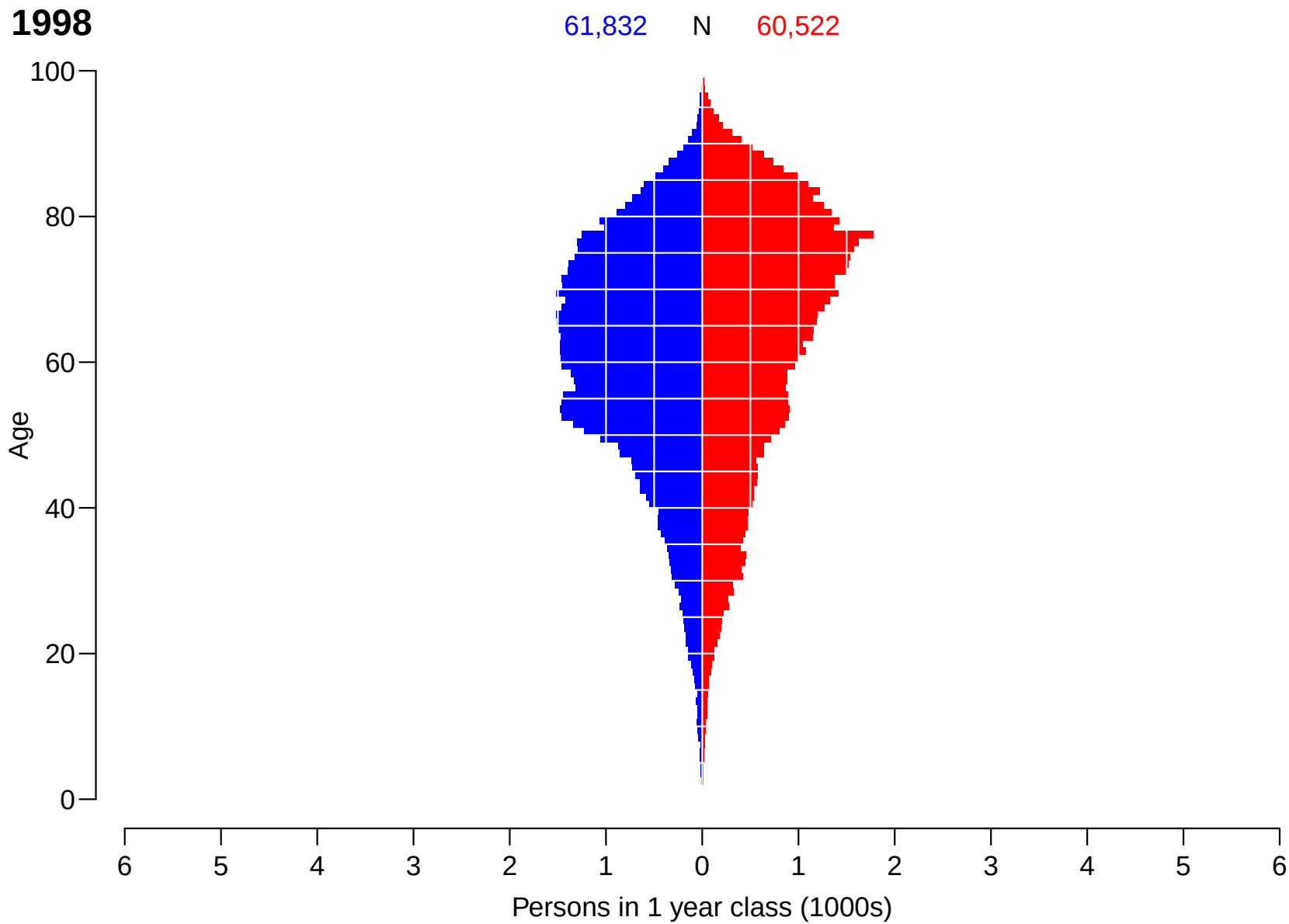

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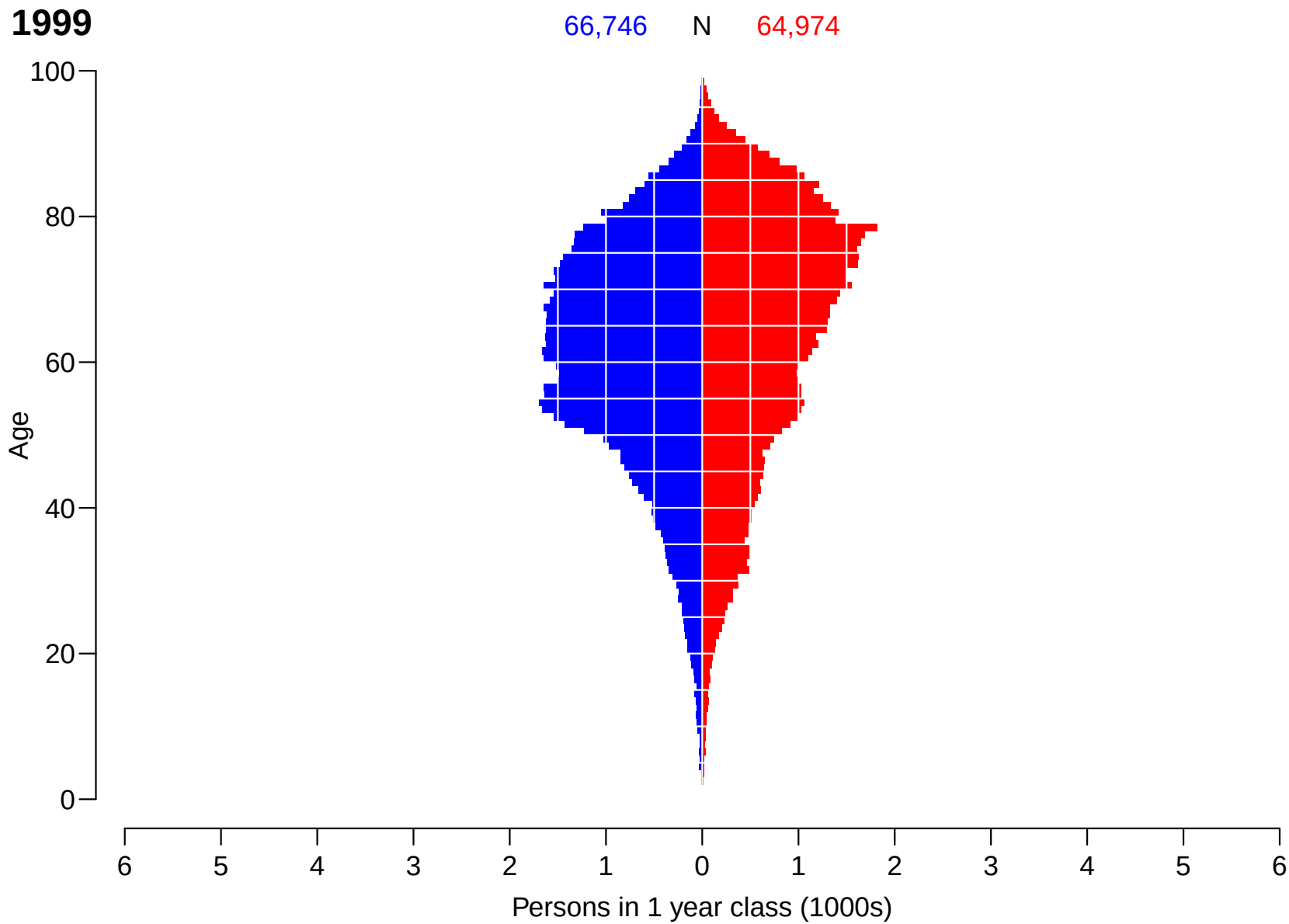

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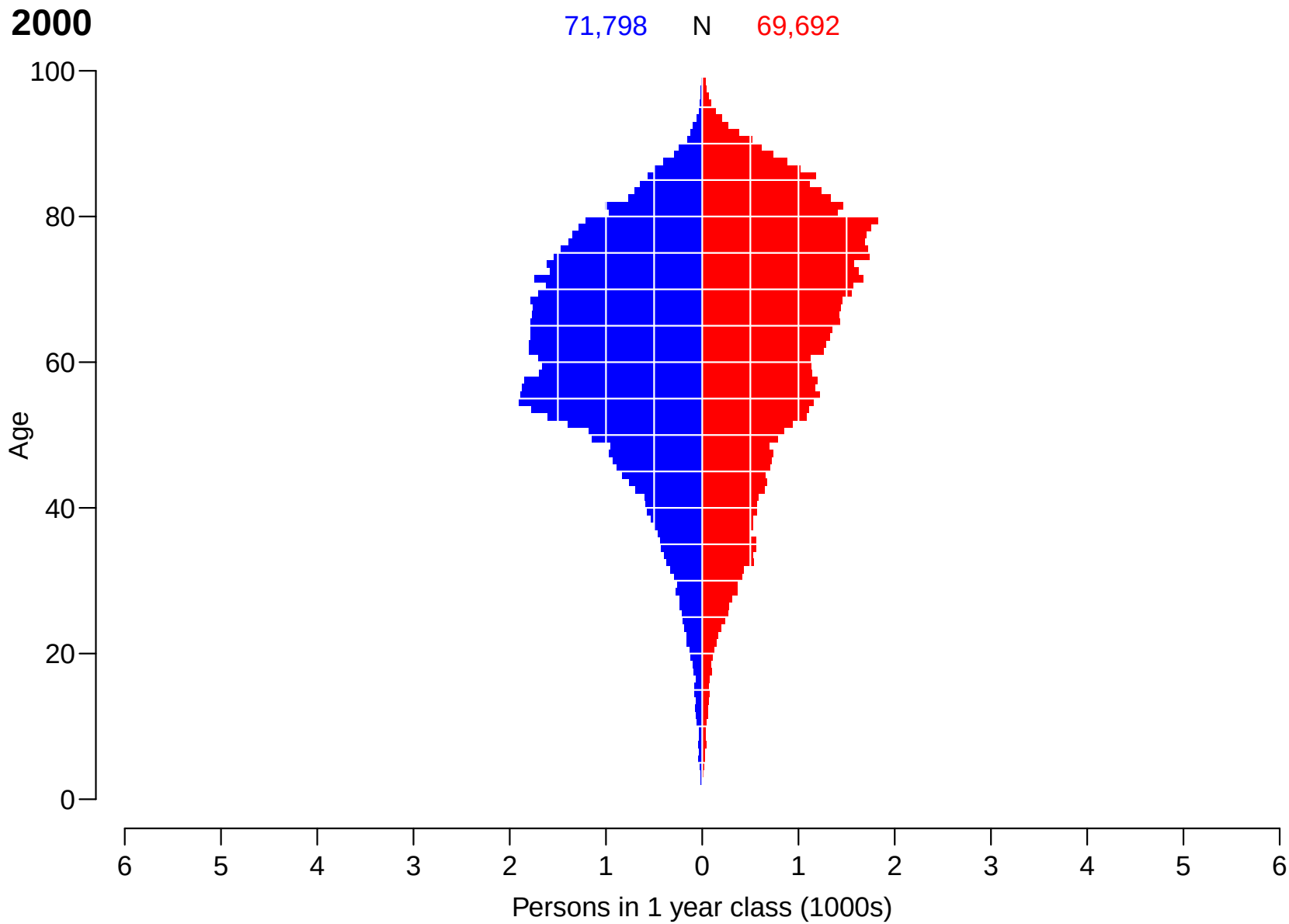

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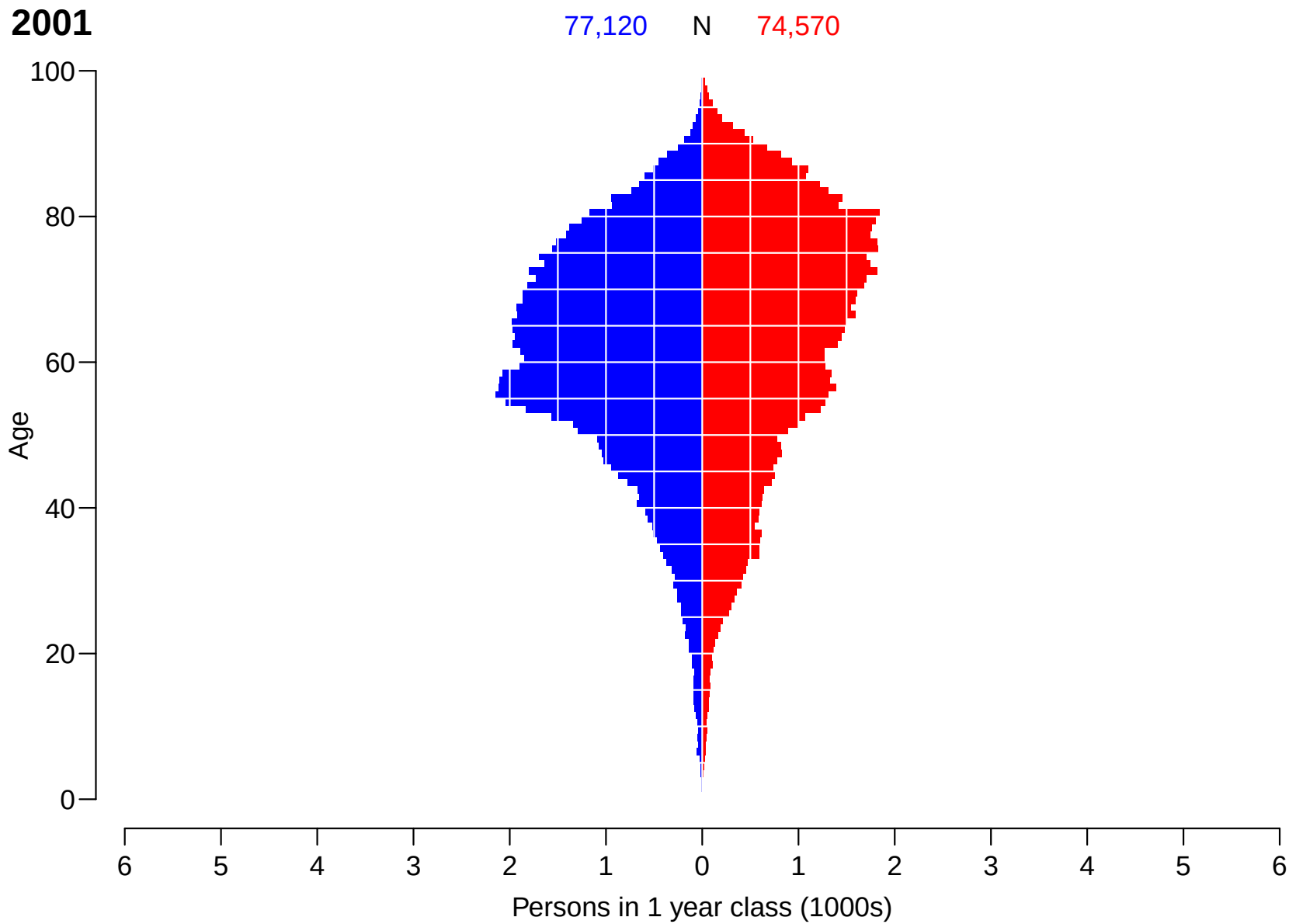

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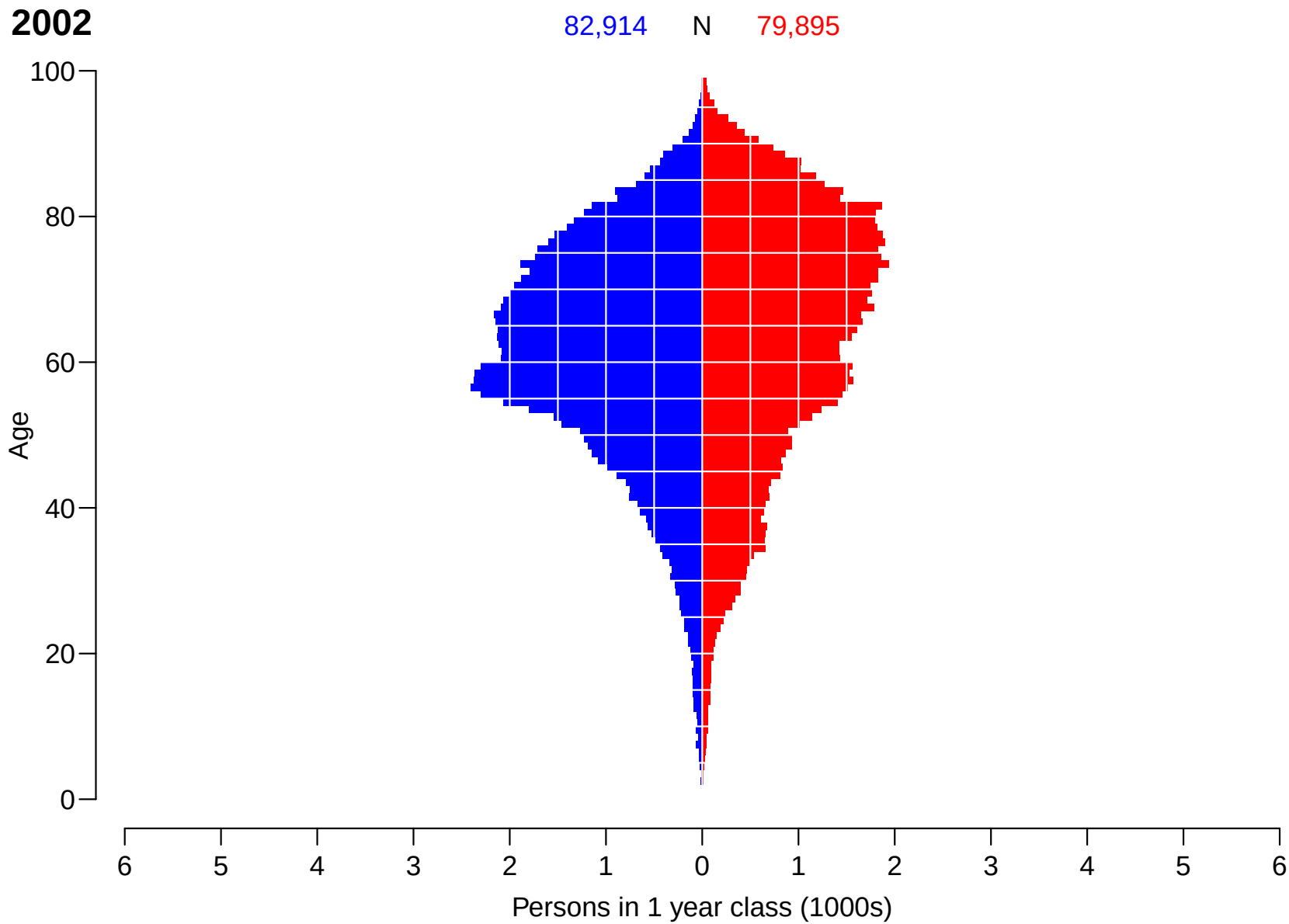

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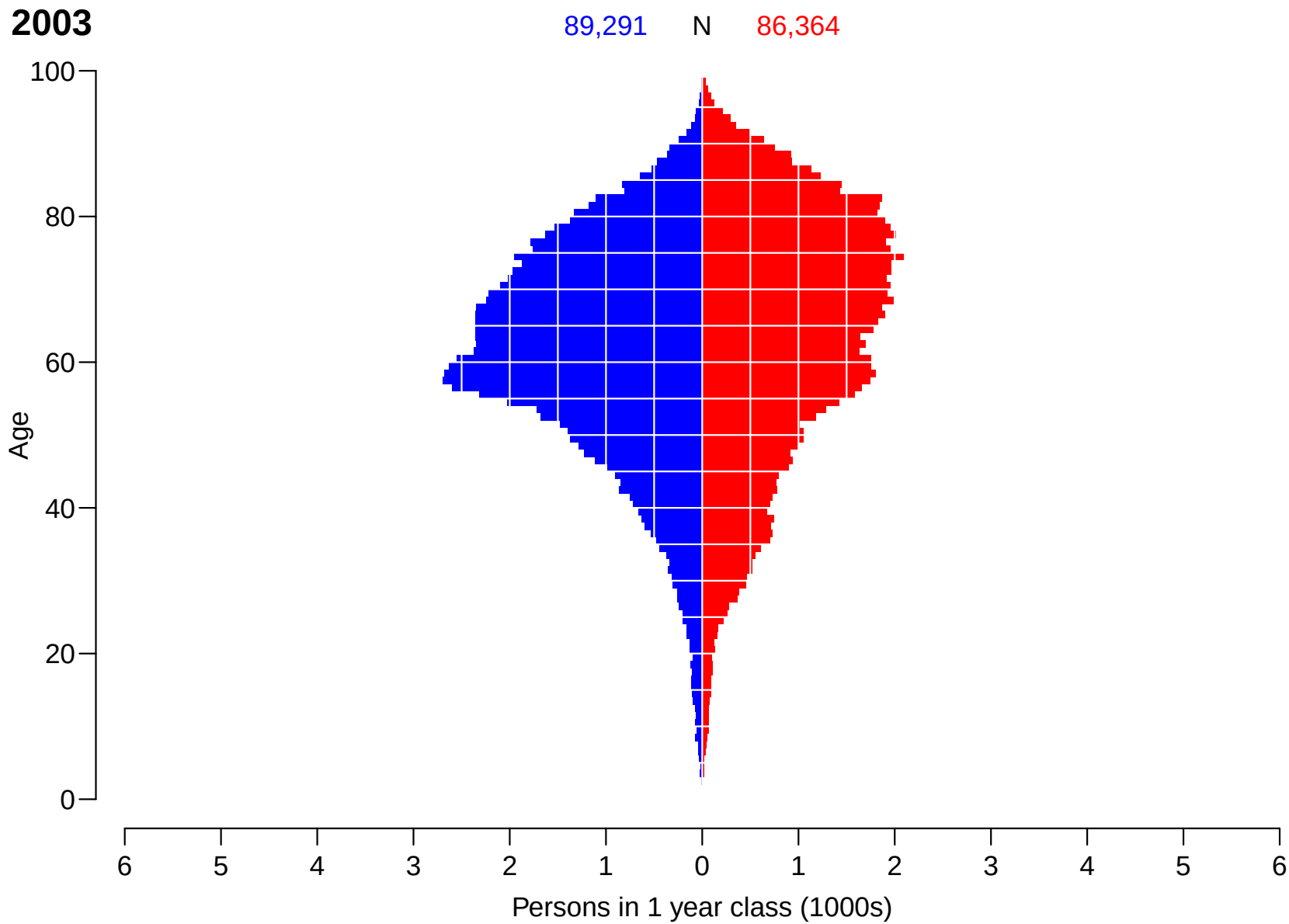

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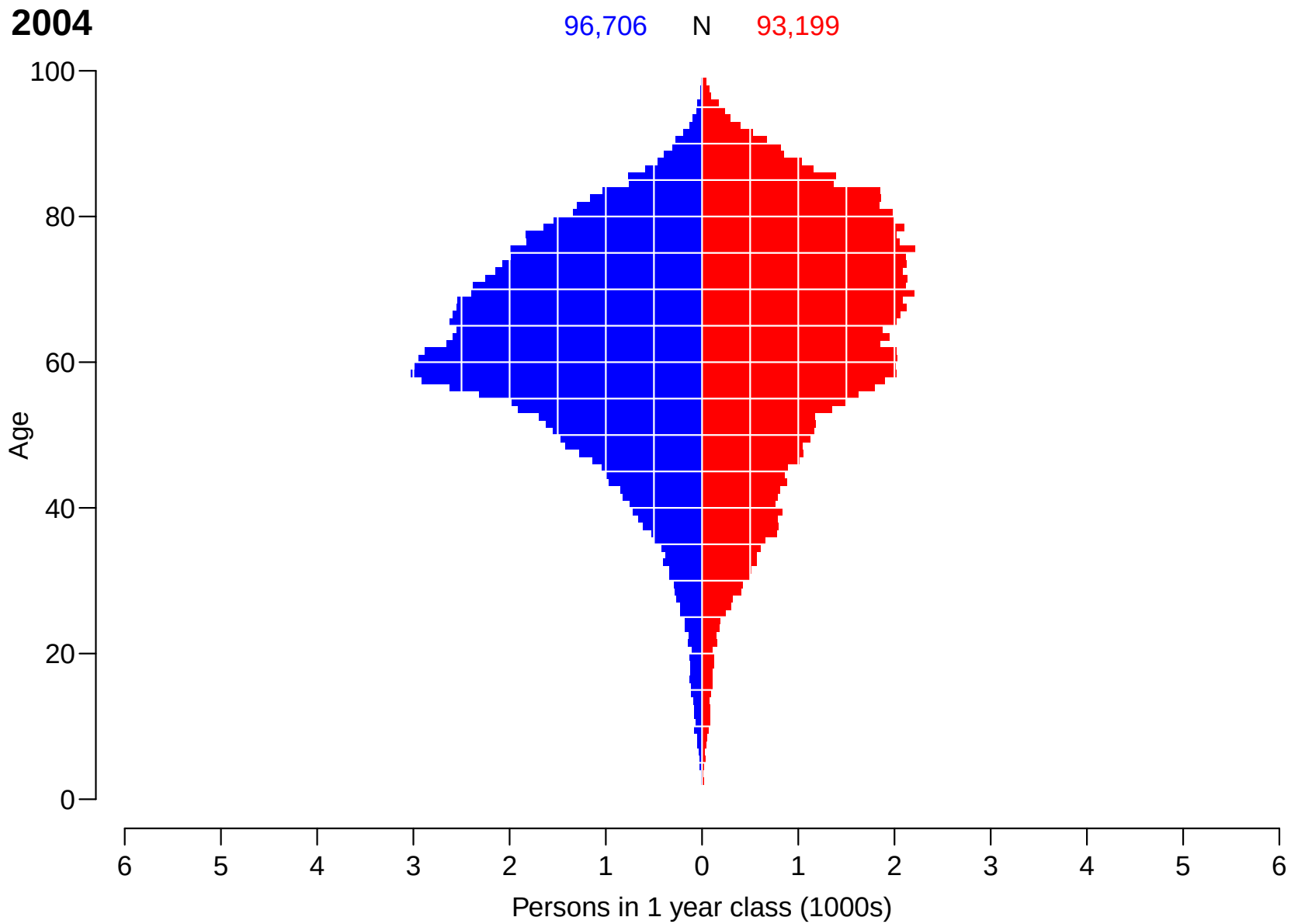

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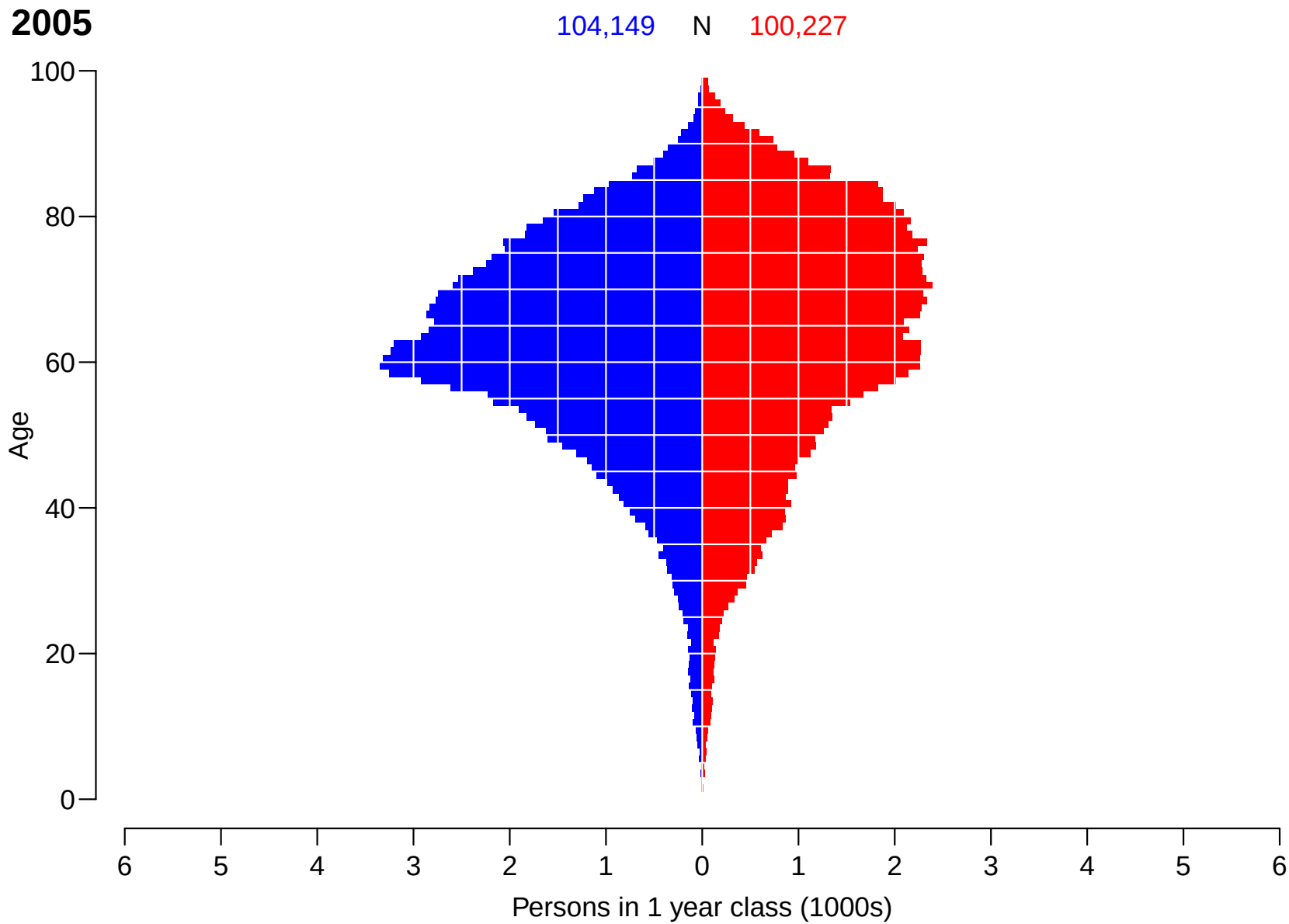

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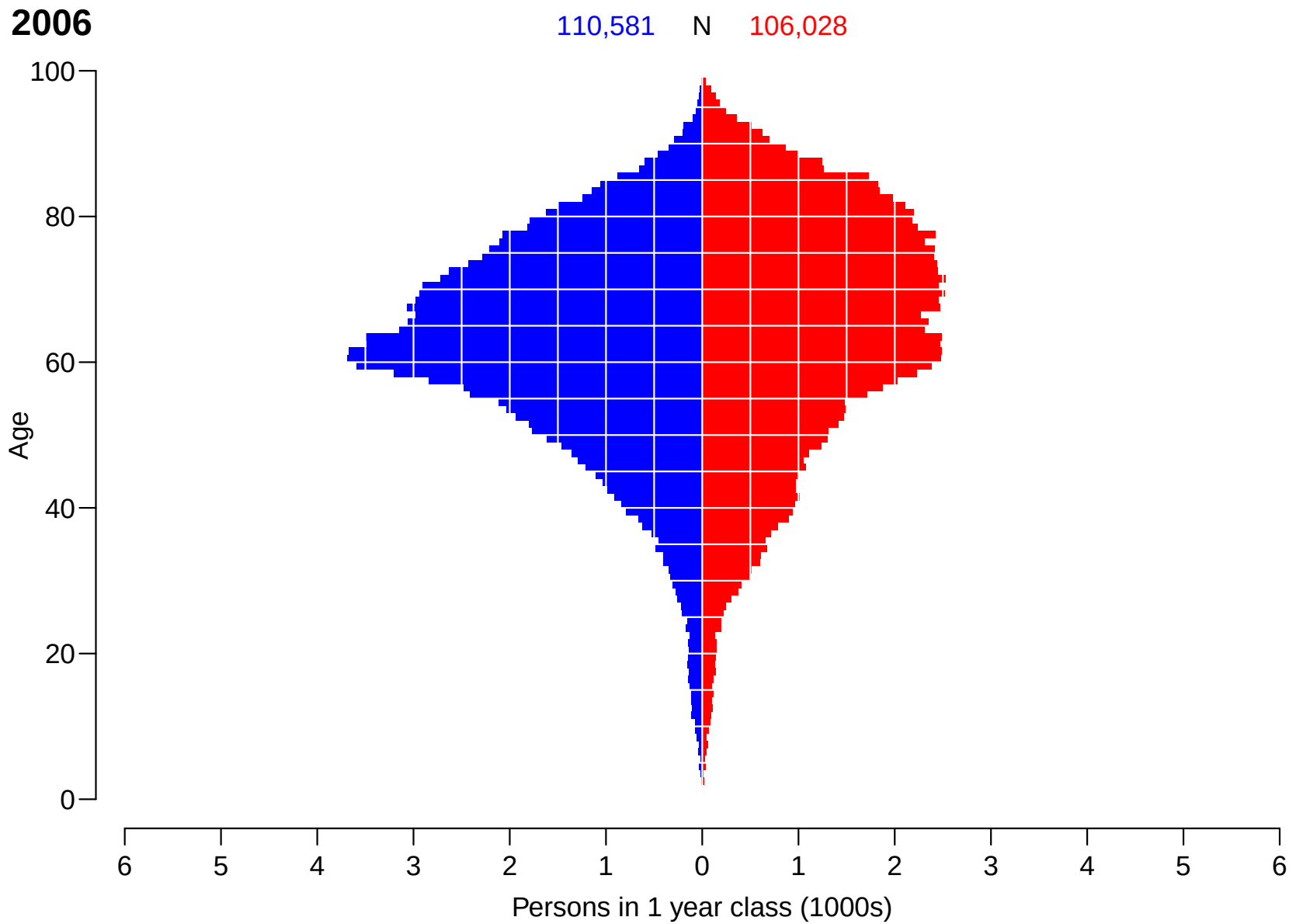

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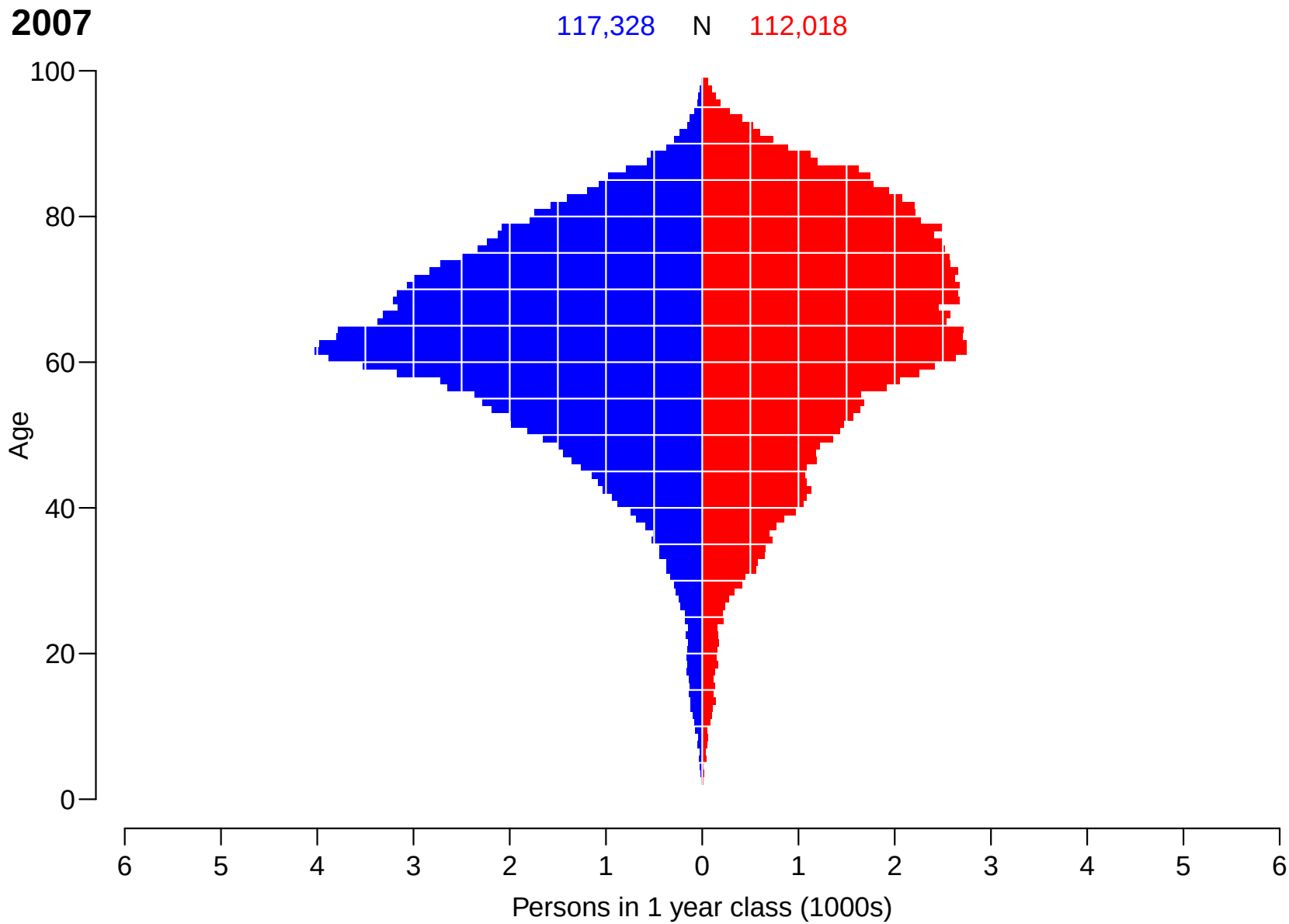

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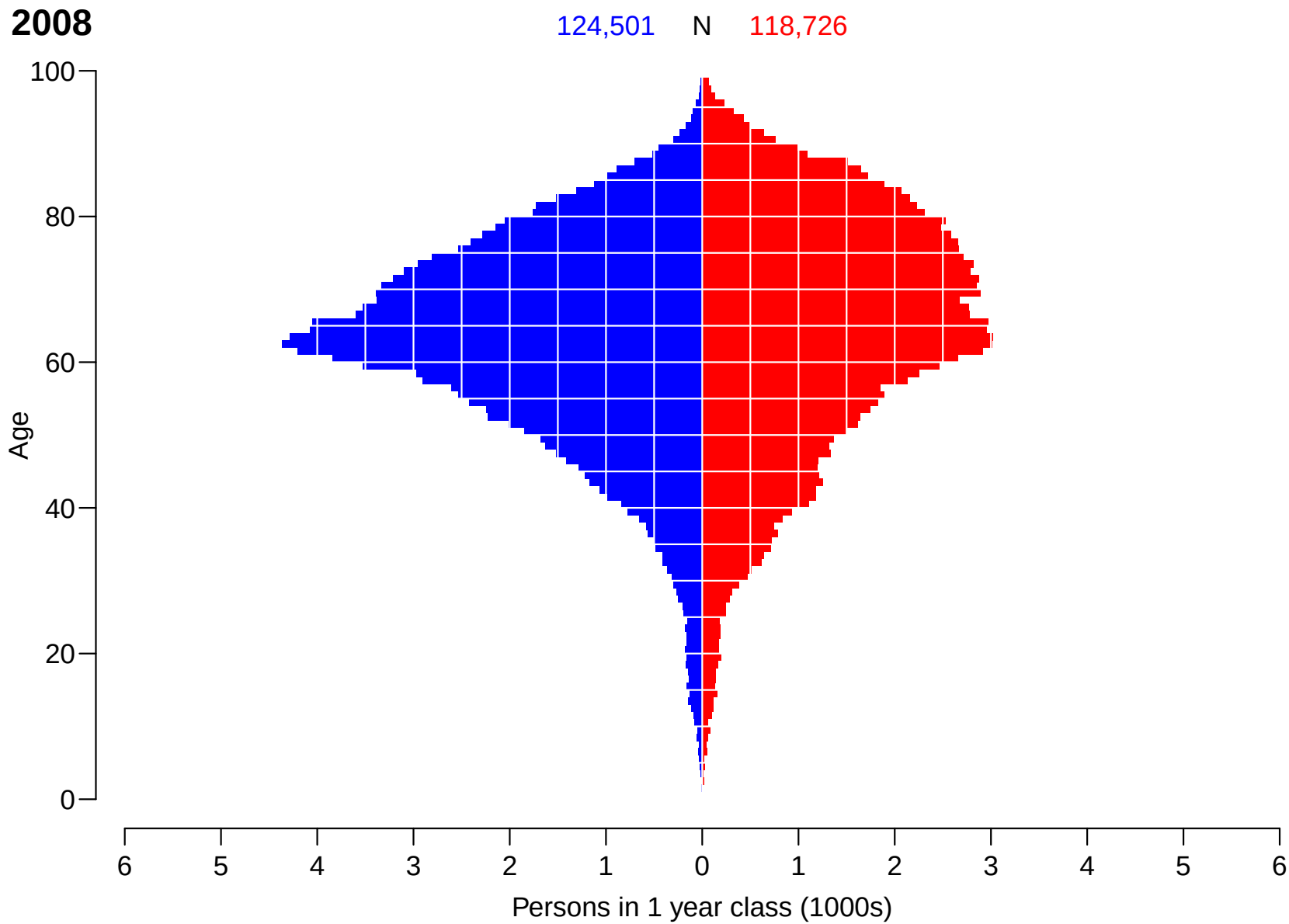

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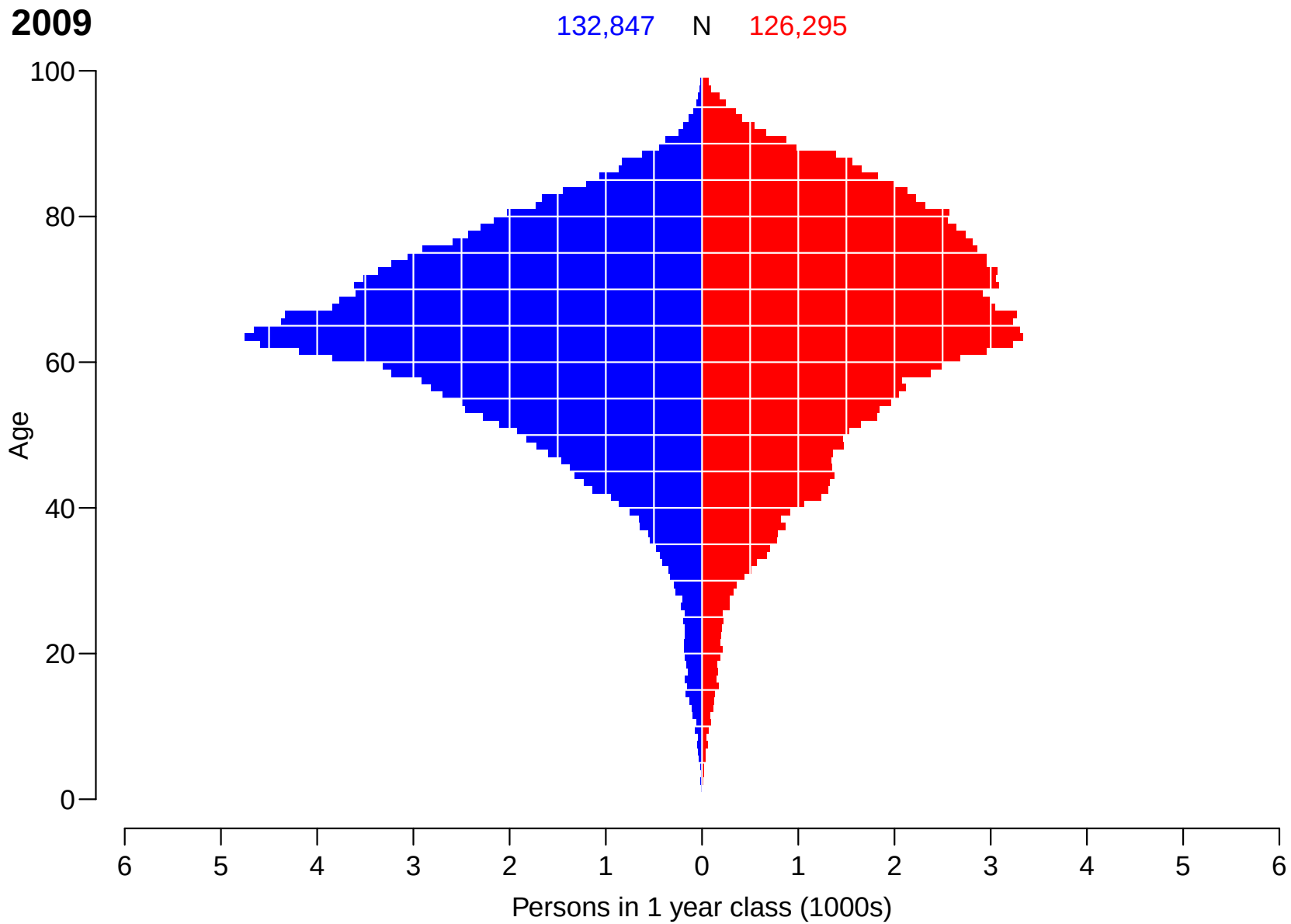

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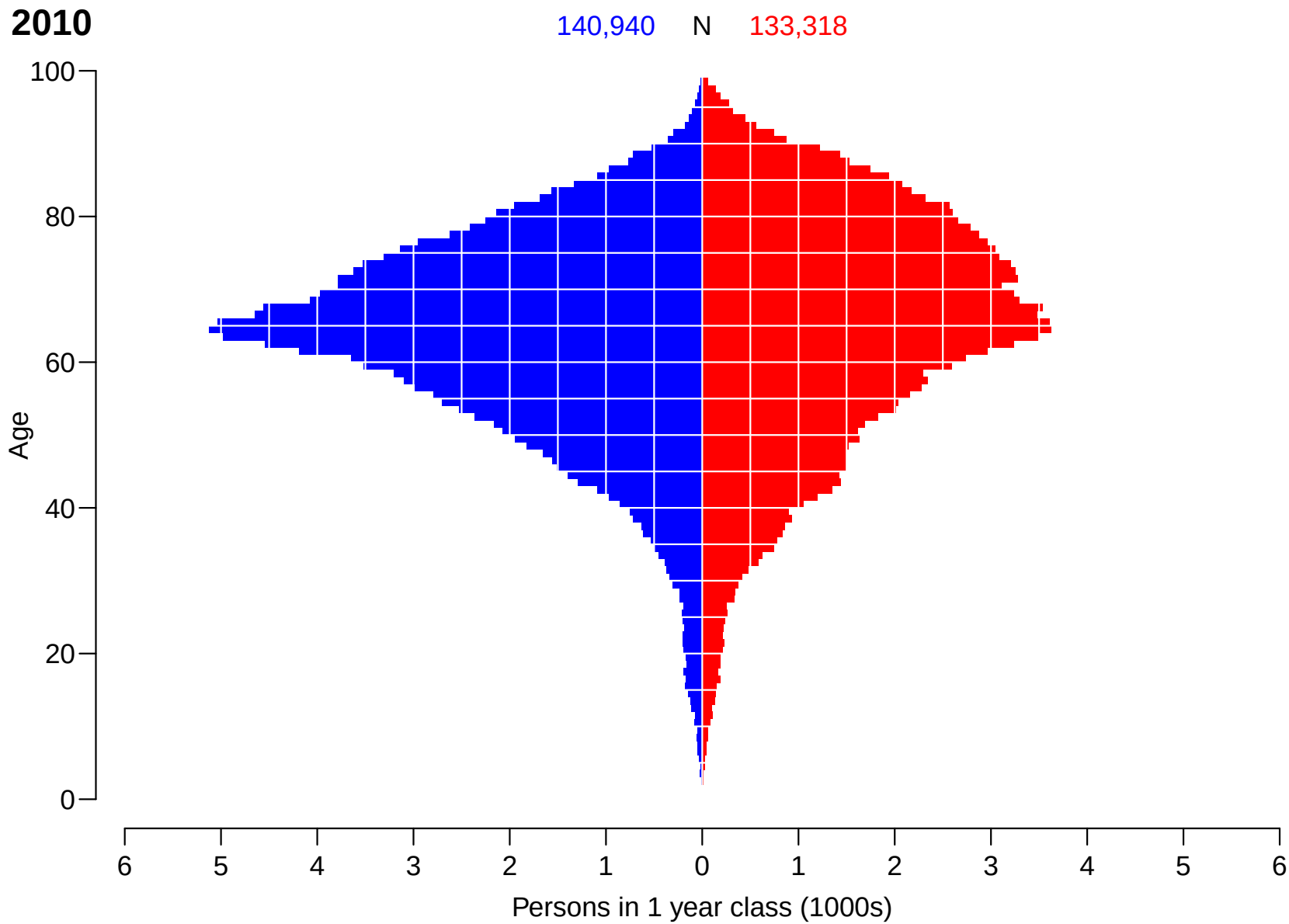

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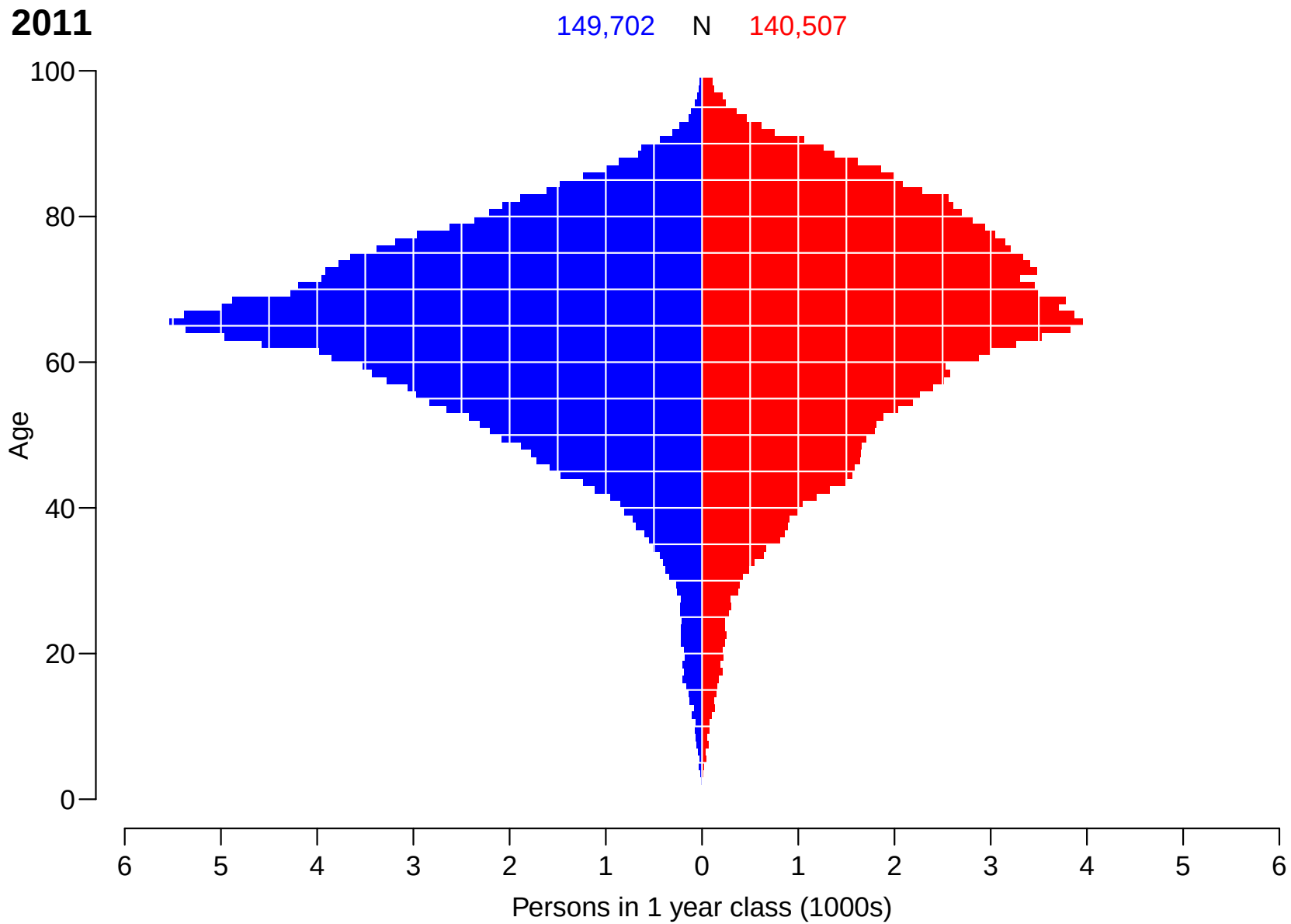

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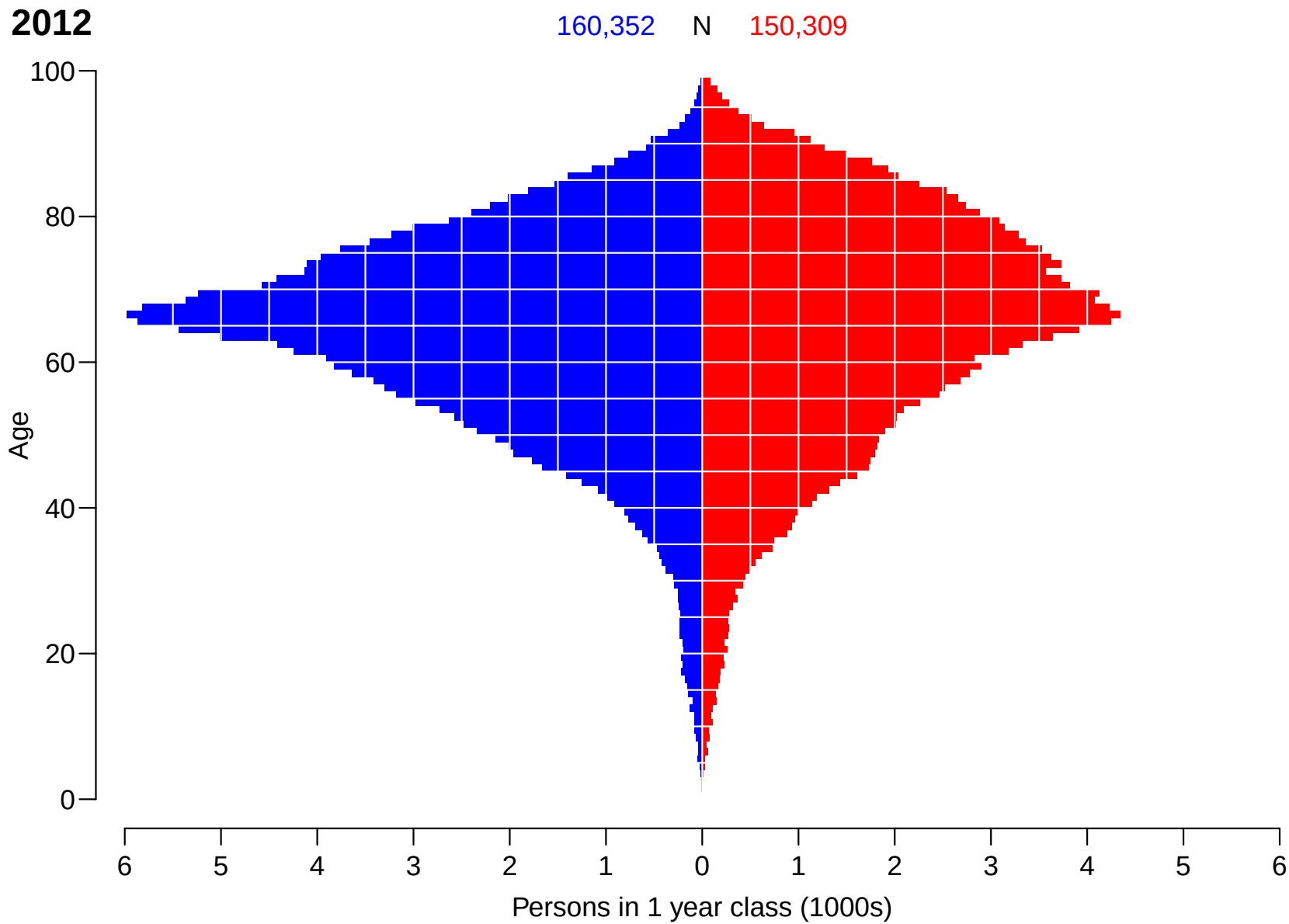

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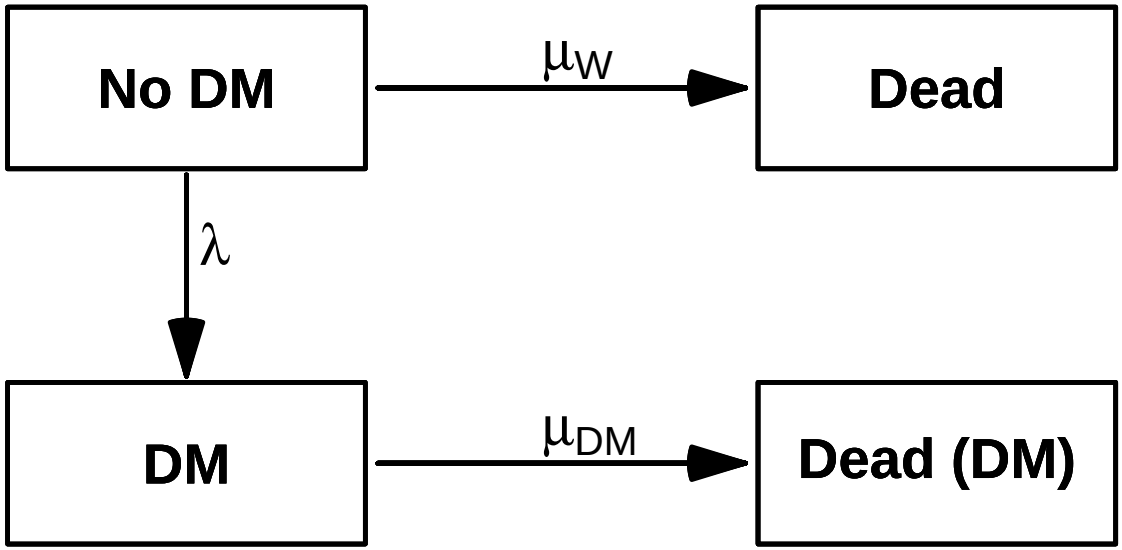
- Look at age-specific **prevalences**,
  not the **numbers** of DM-patients.

DM prevalence prediction



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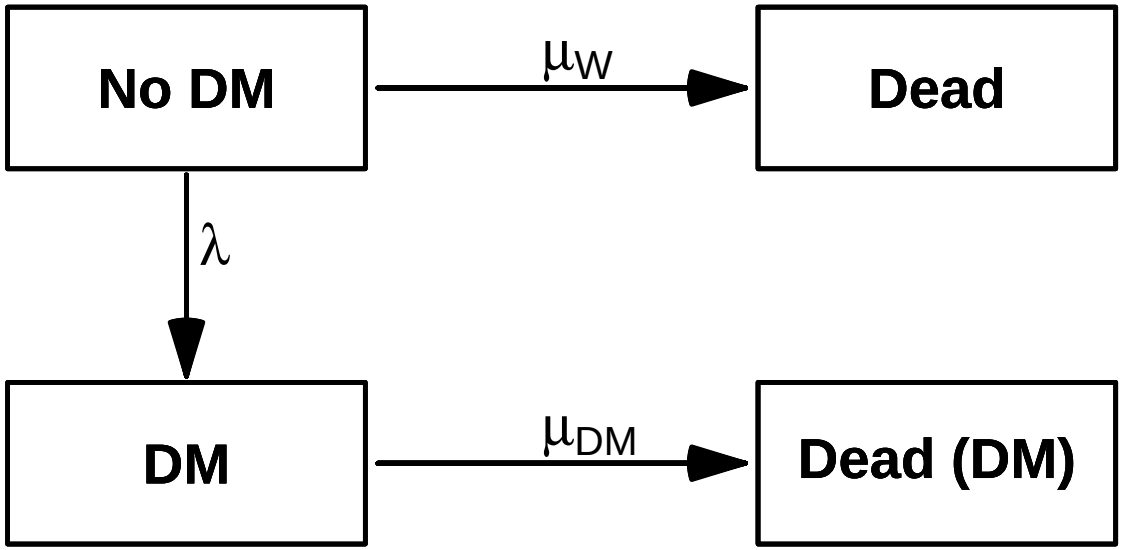

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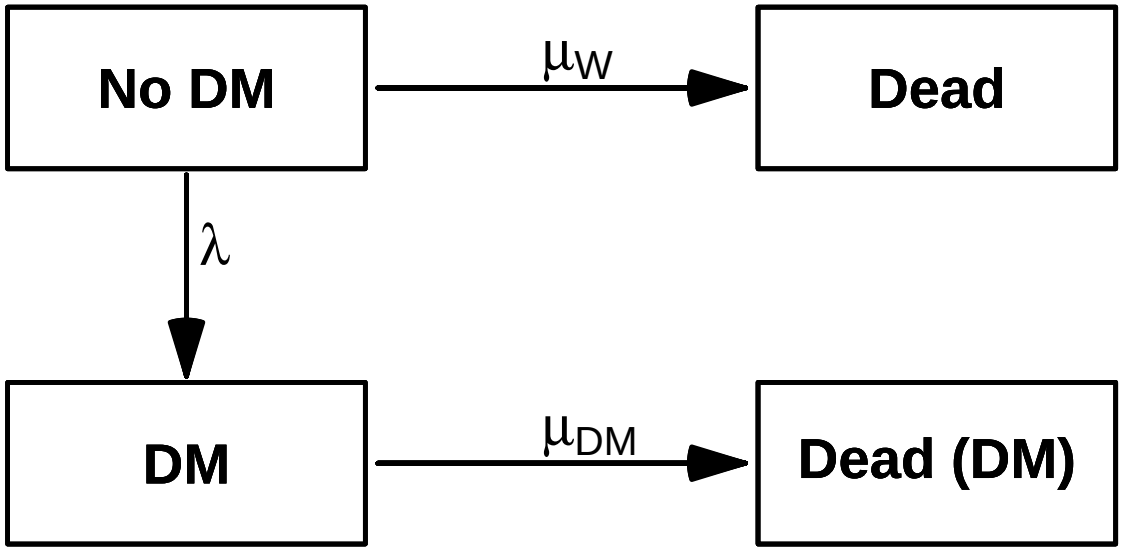

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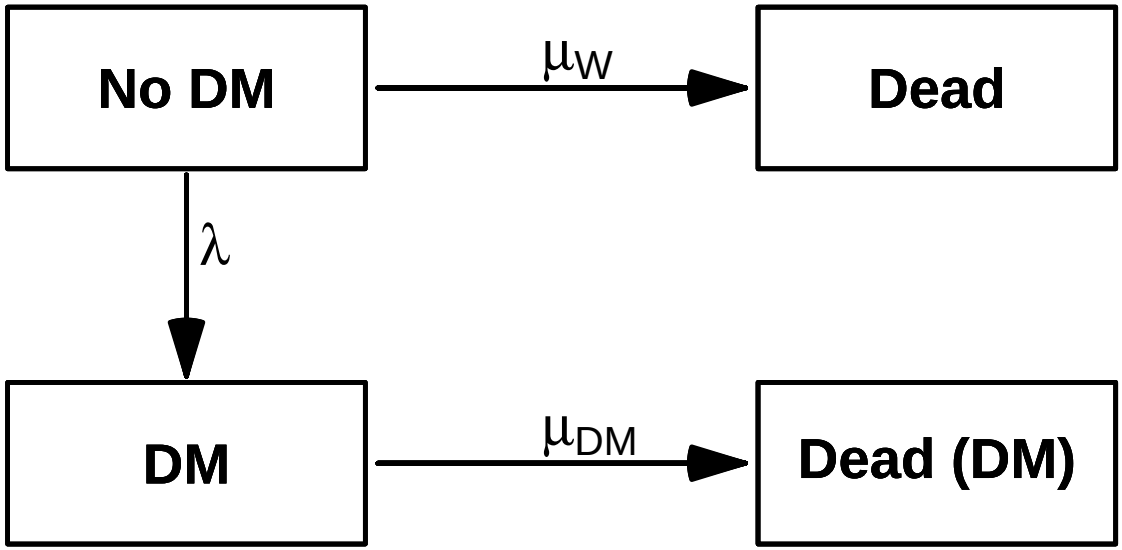

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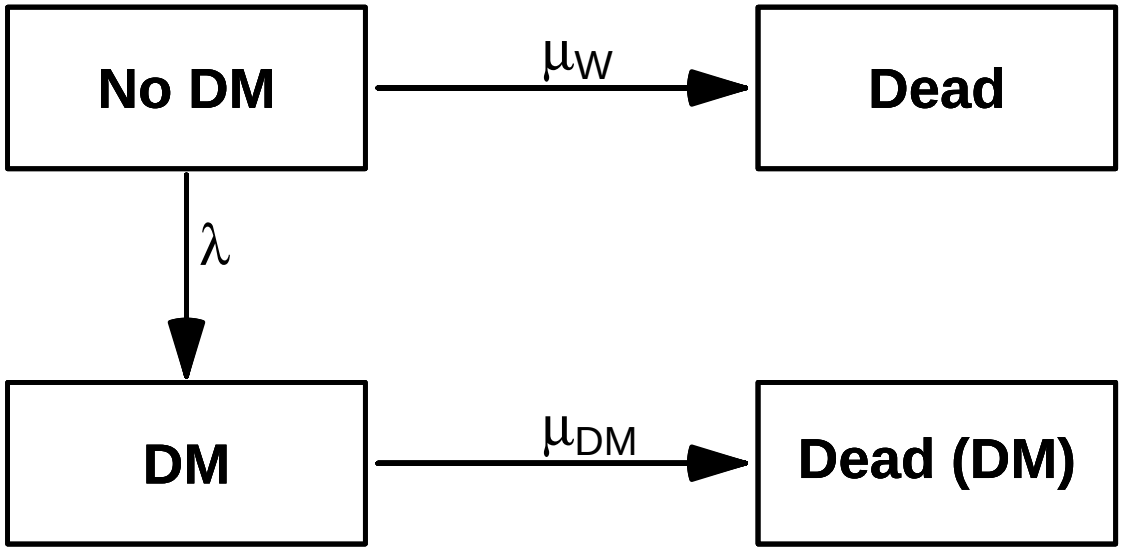
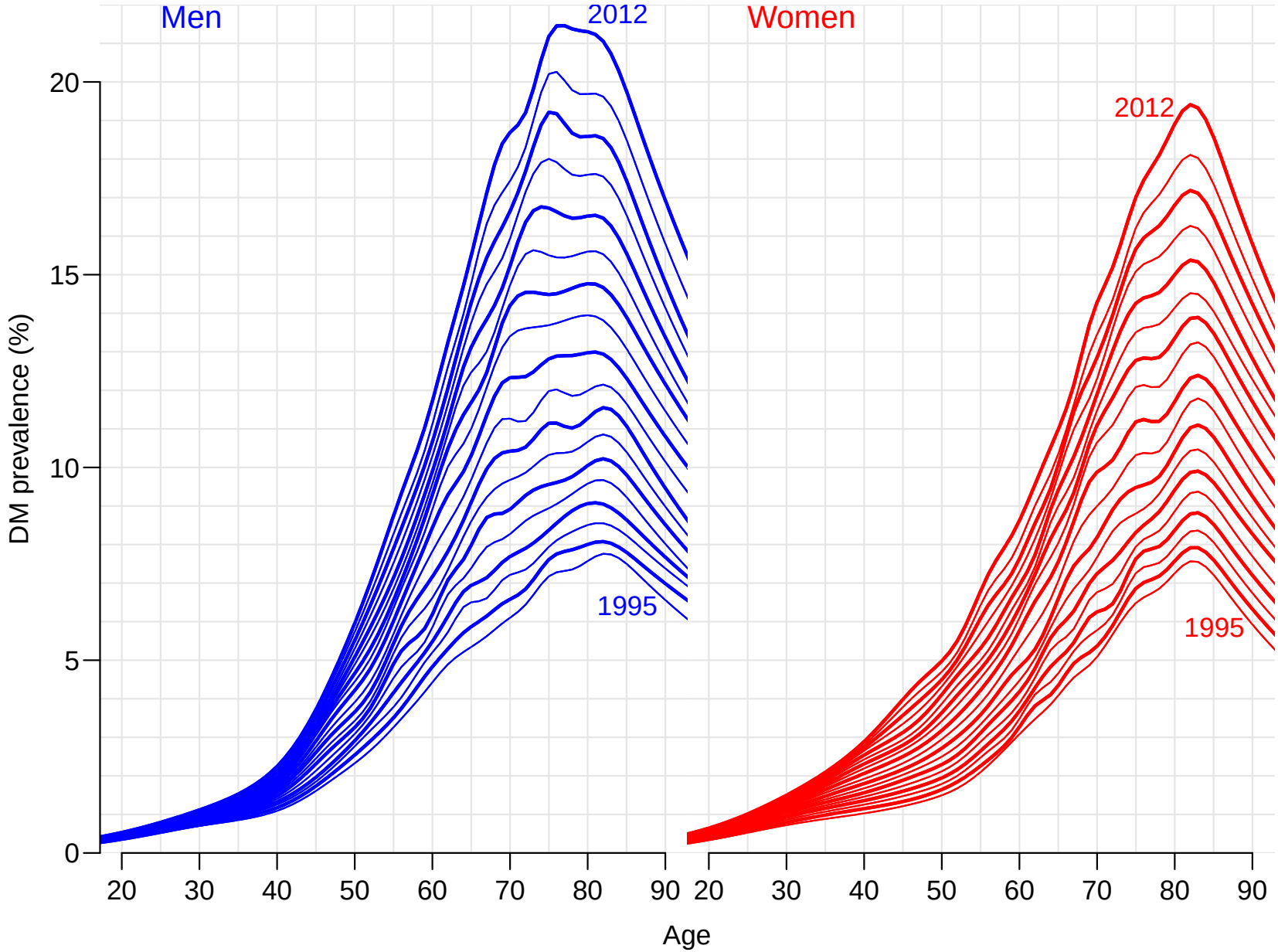


- Rates all modeled by APC-models with spline terms
- If we know
  - prevalence of DM in 1995
  - the rates in the period 1.1.1995-1.1.2012
- —then we can predict prevalences at 1.1.2012

Age-specific prevalences 1995–2012:



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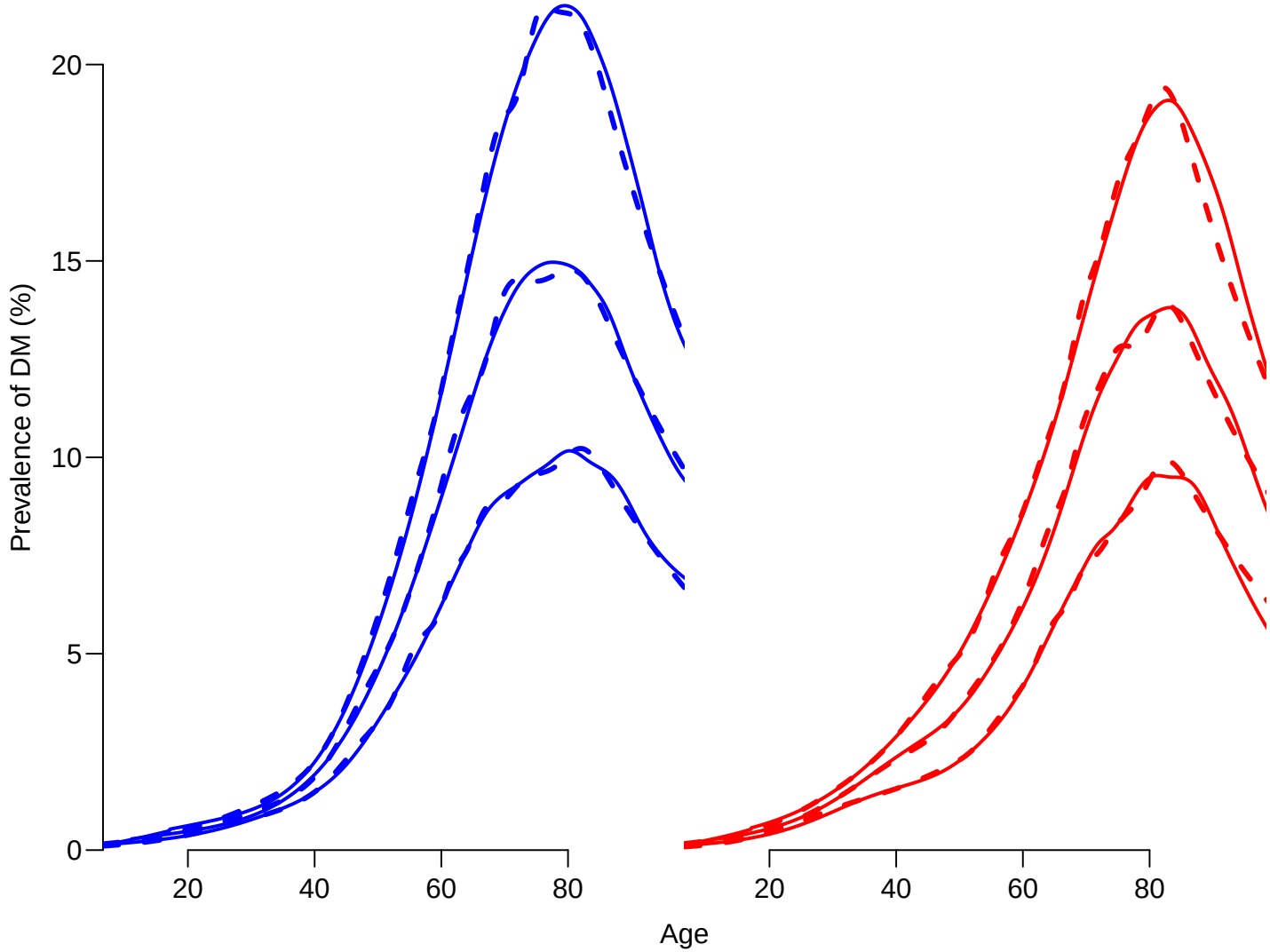
Actual updating interval used: $1/10$ year



Full: Obs. prevalence 2000, 2006, 2012

Broken: APC-model

DM prevalence components

- Four scenarios:

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- Four scenarios:
  - Rates develop as observed
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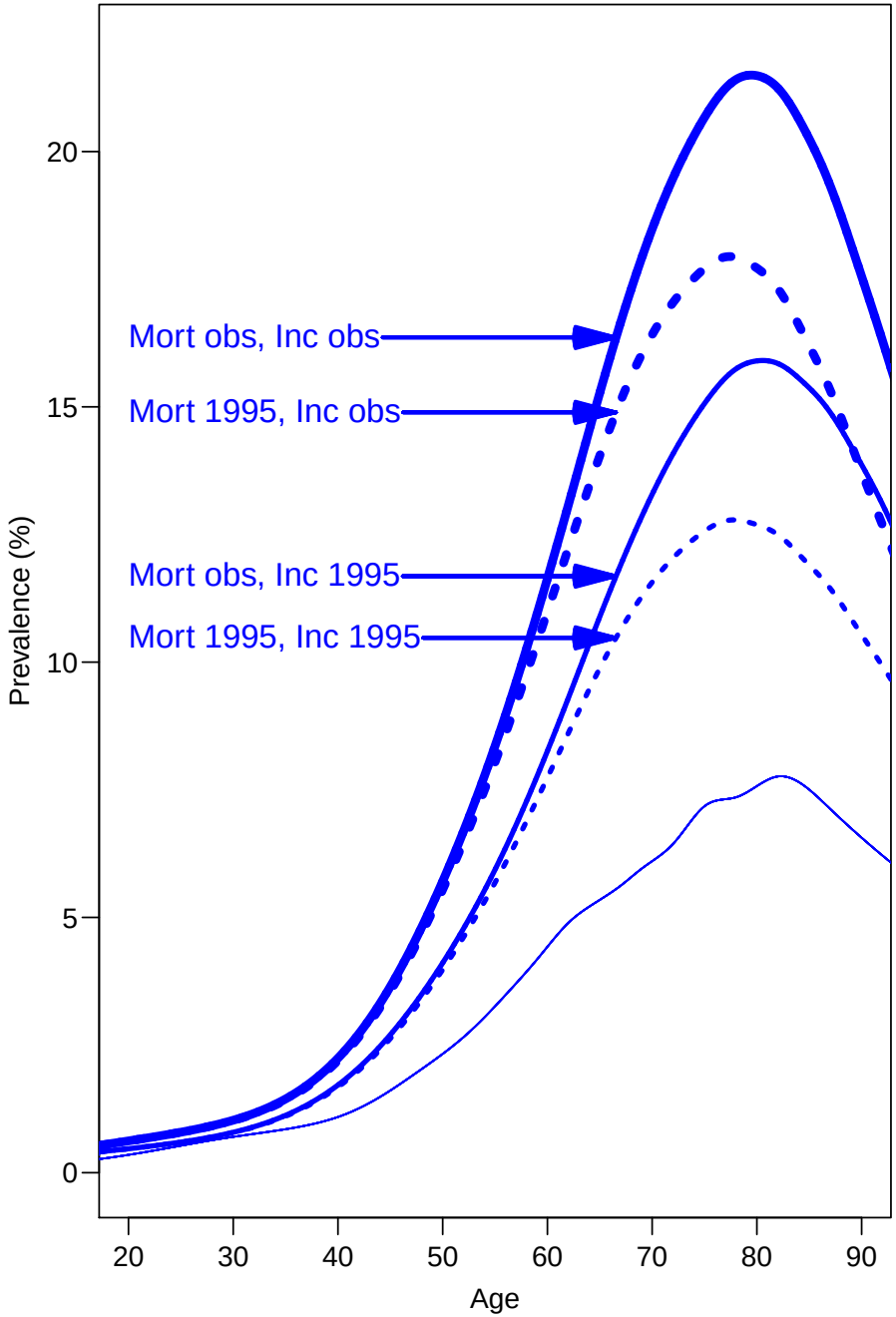
- Differences between these can be transformed to 4 **components** of prevalence:

Mort:	DM-ptt. alive because of declining mortality
Inc:	DM-ptt. because of increasing incidence
Const:	DM-ppt. attributable to non-equilibrium in 1995
Org:	DM-ptt. corresponding to 1995 age-specific prevalences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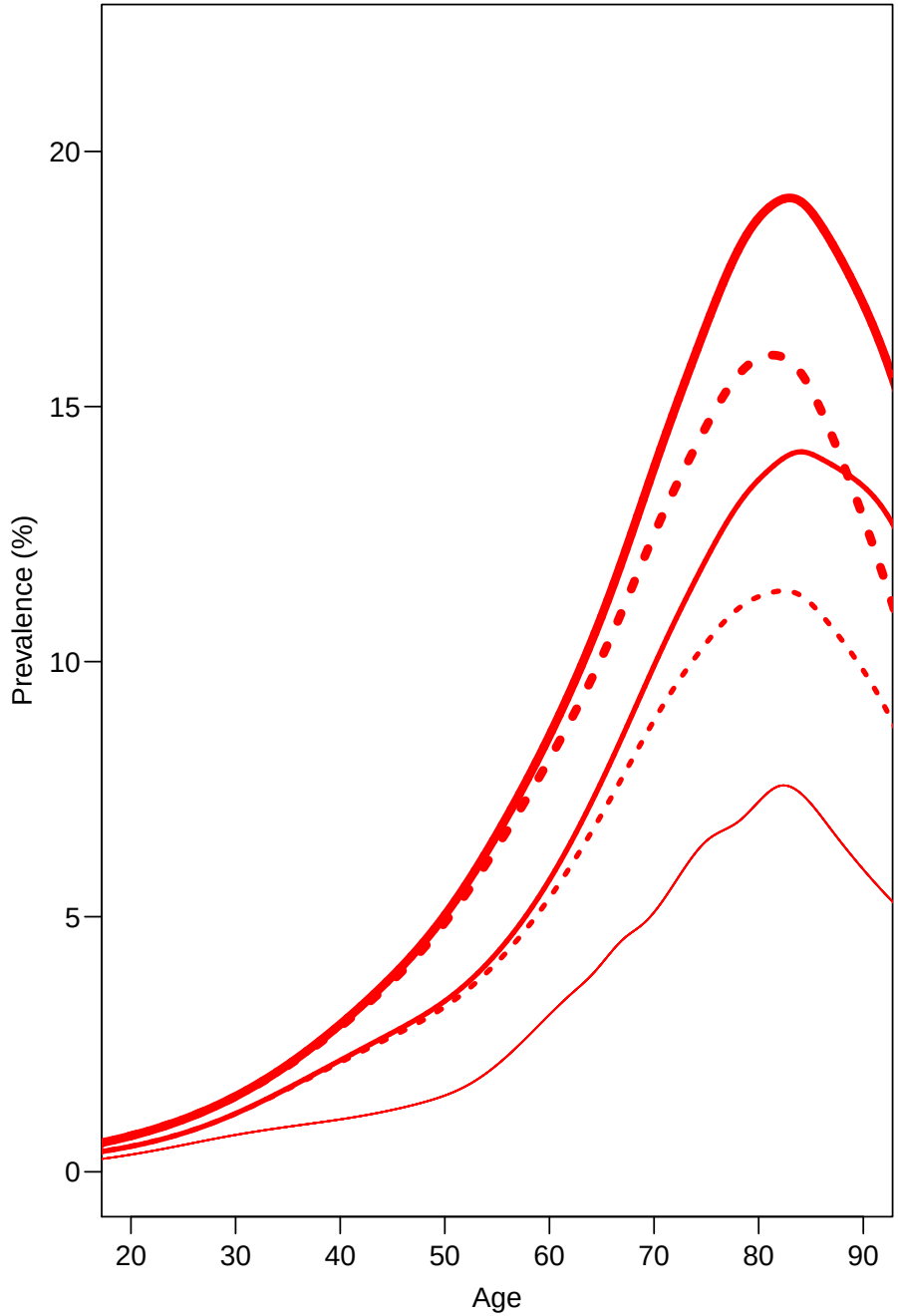
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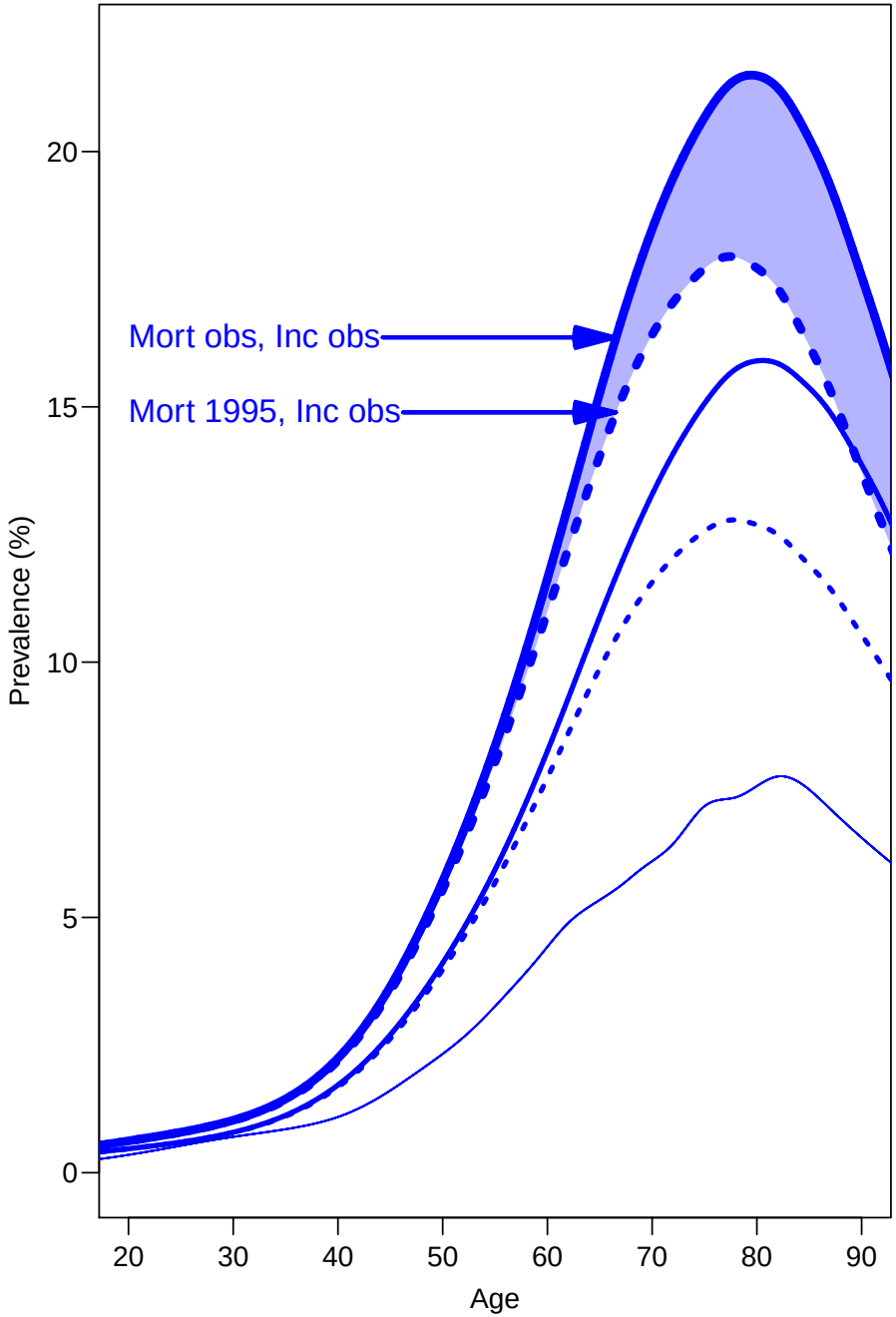
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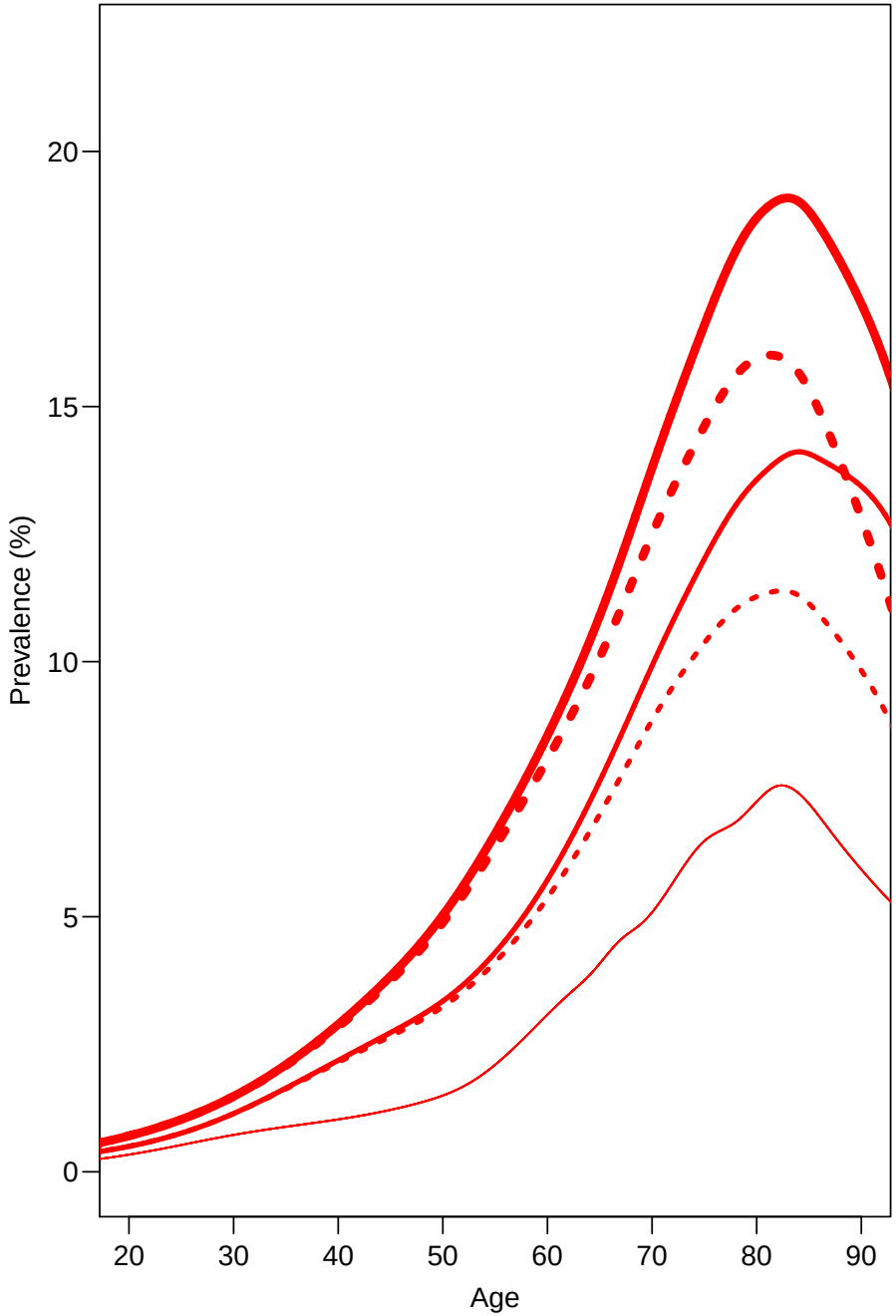
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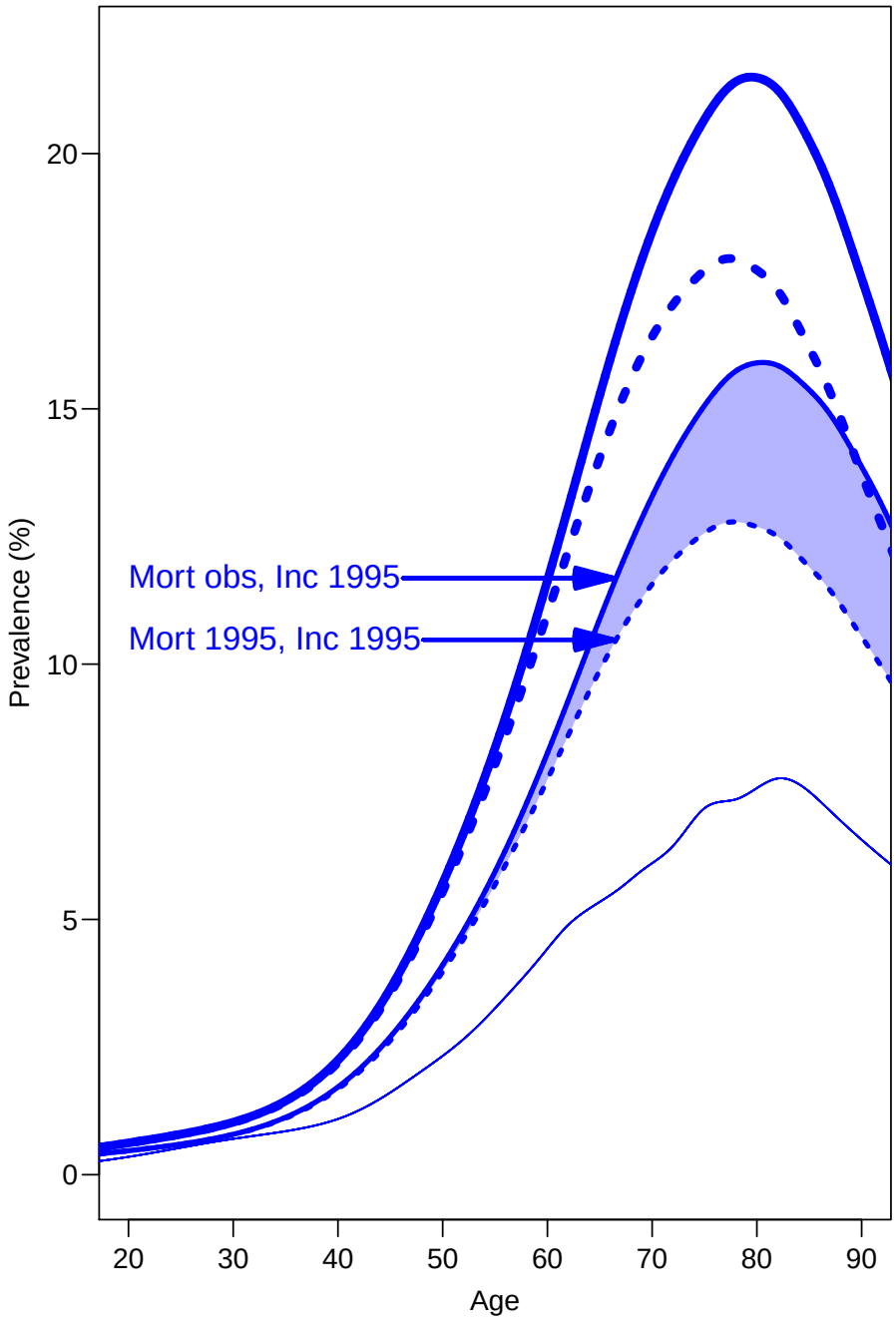
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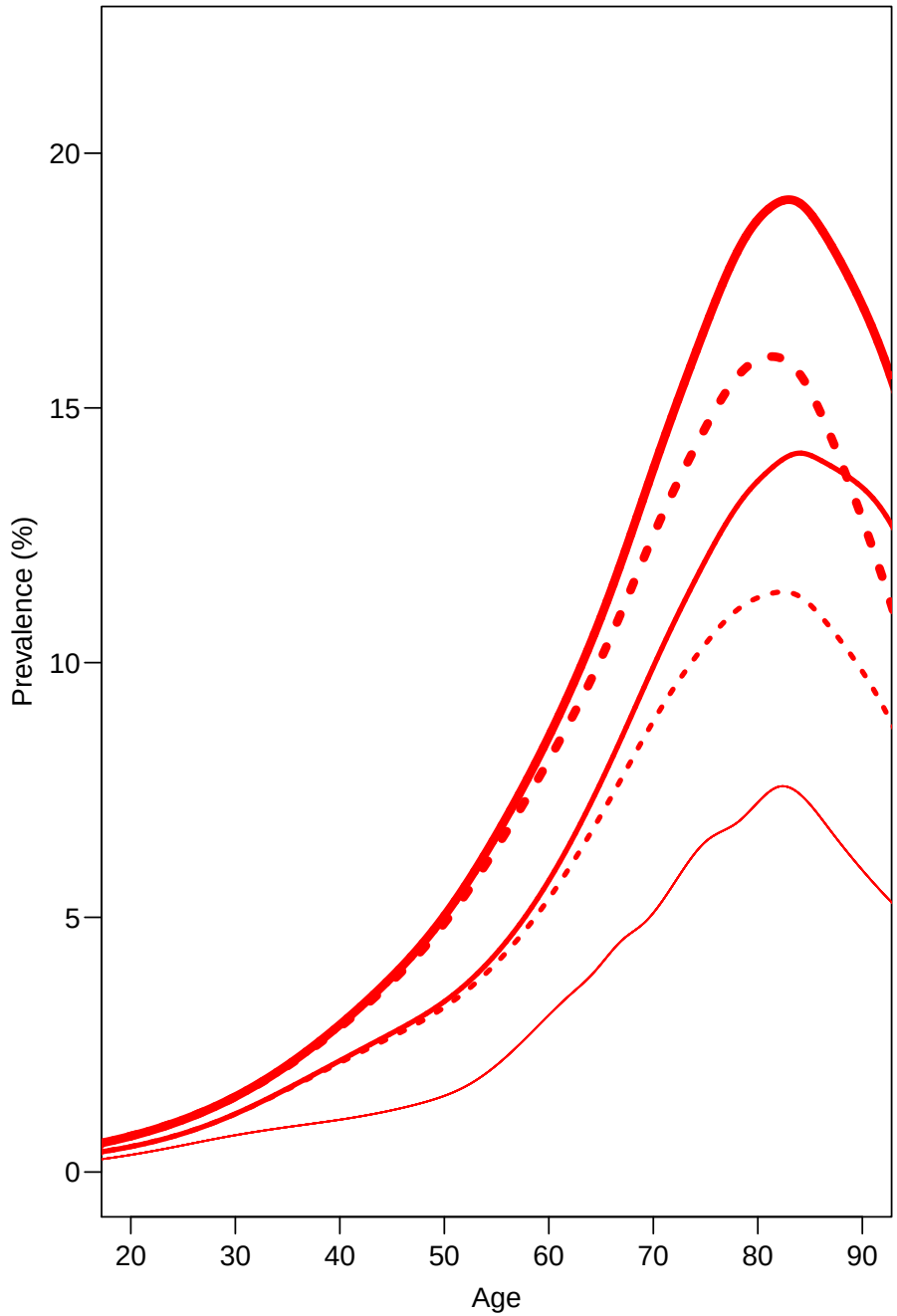
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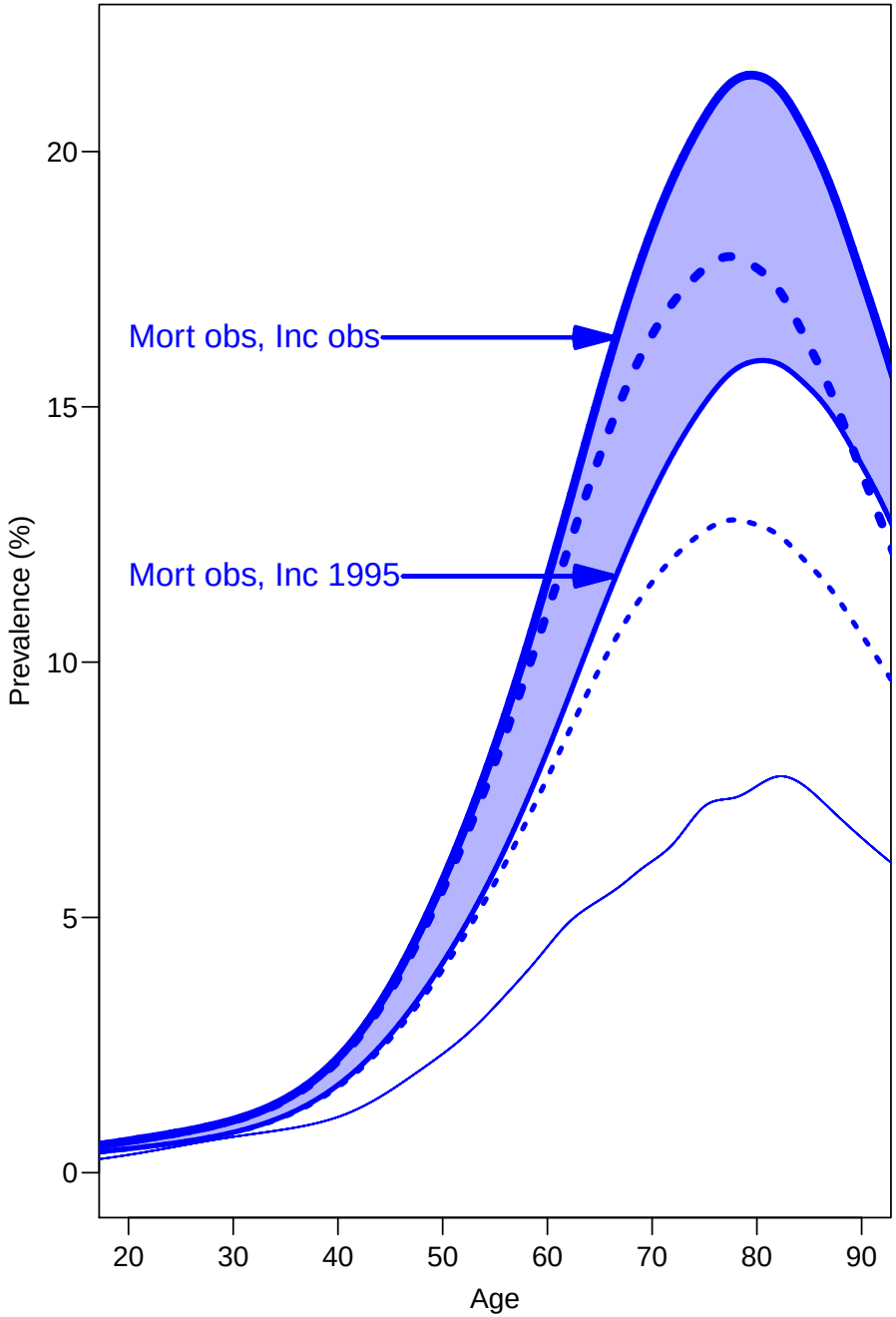
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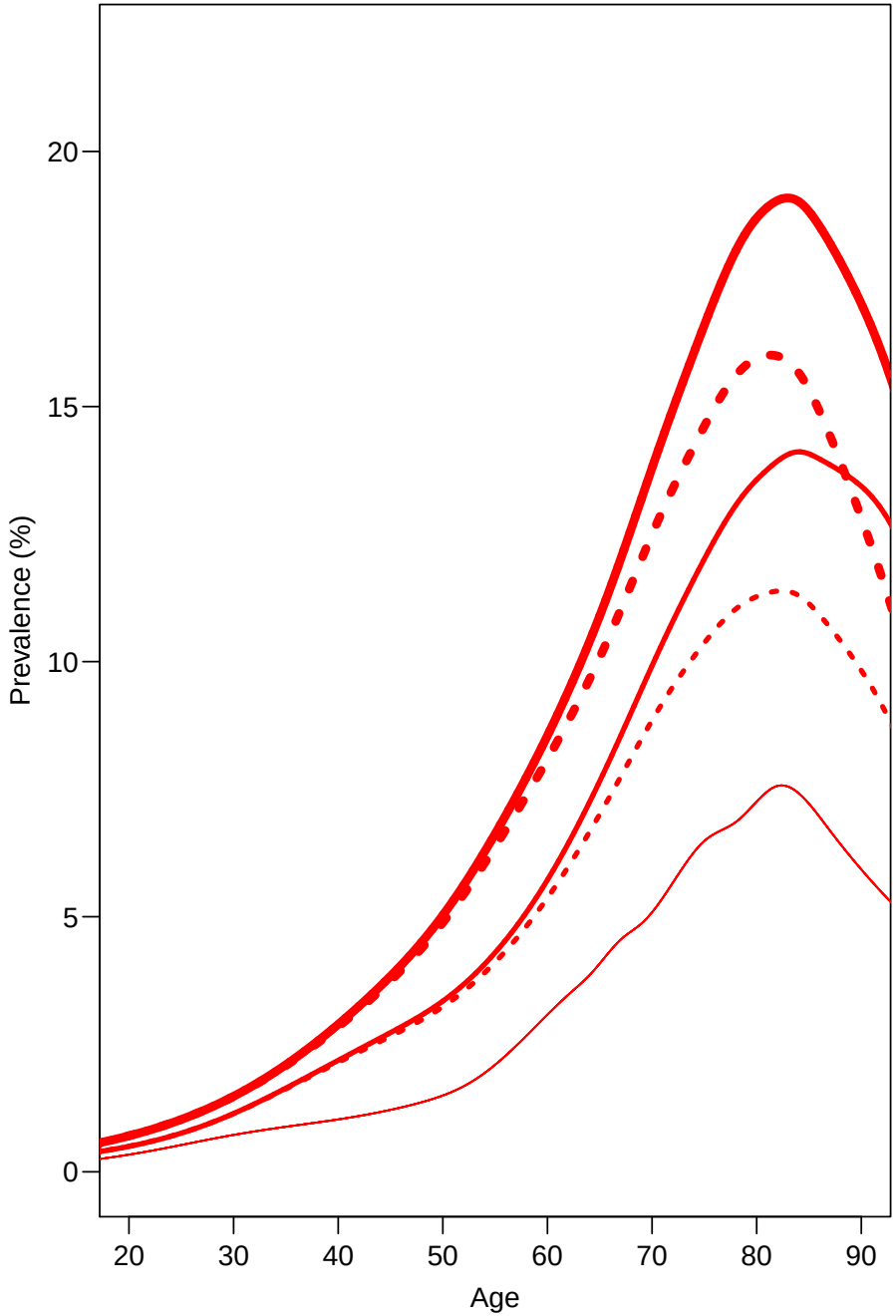
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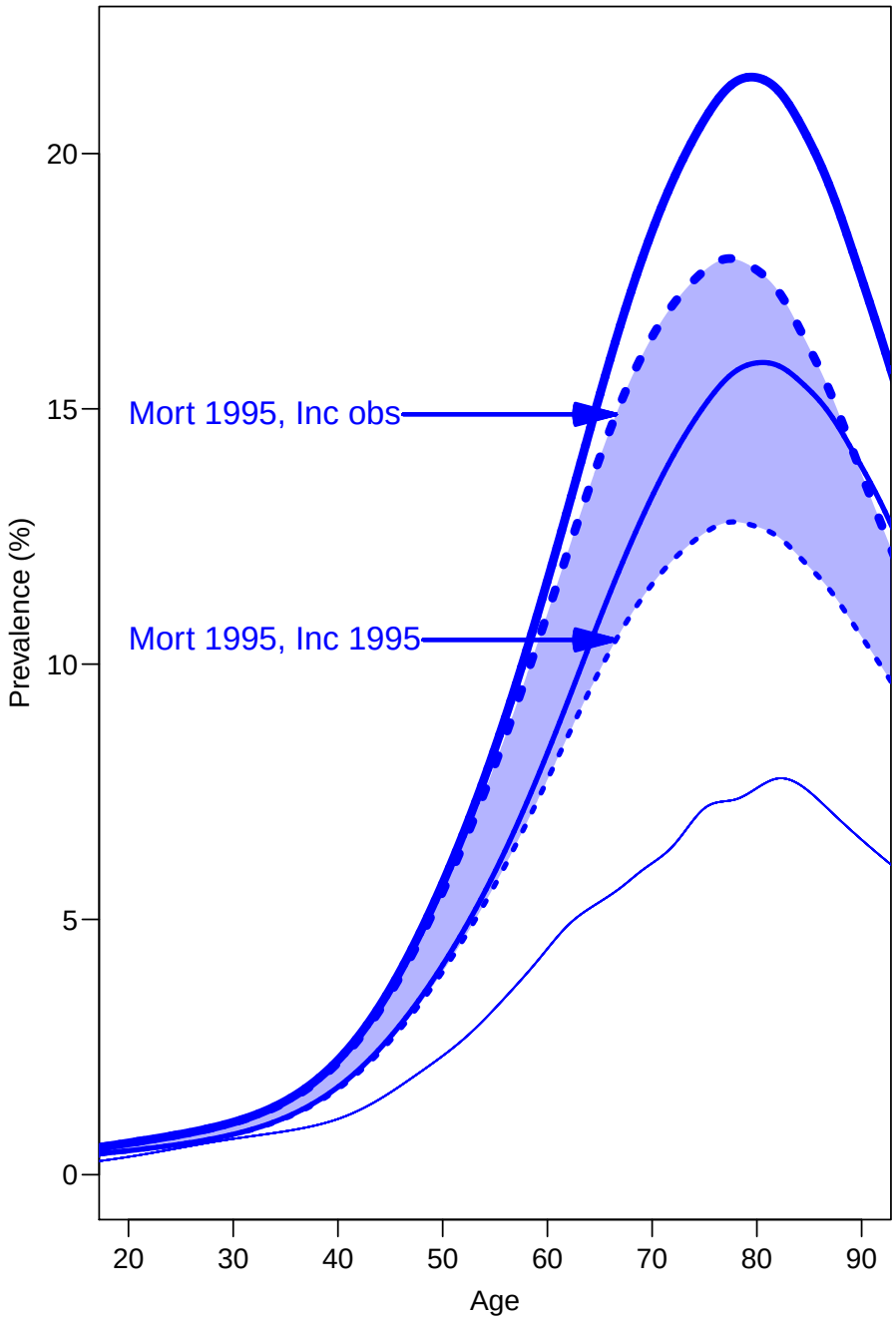
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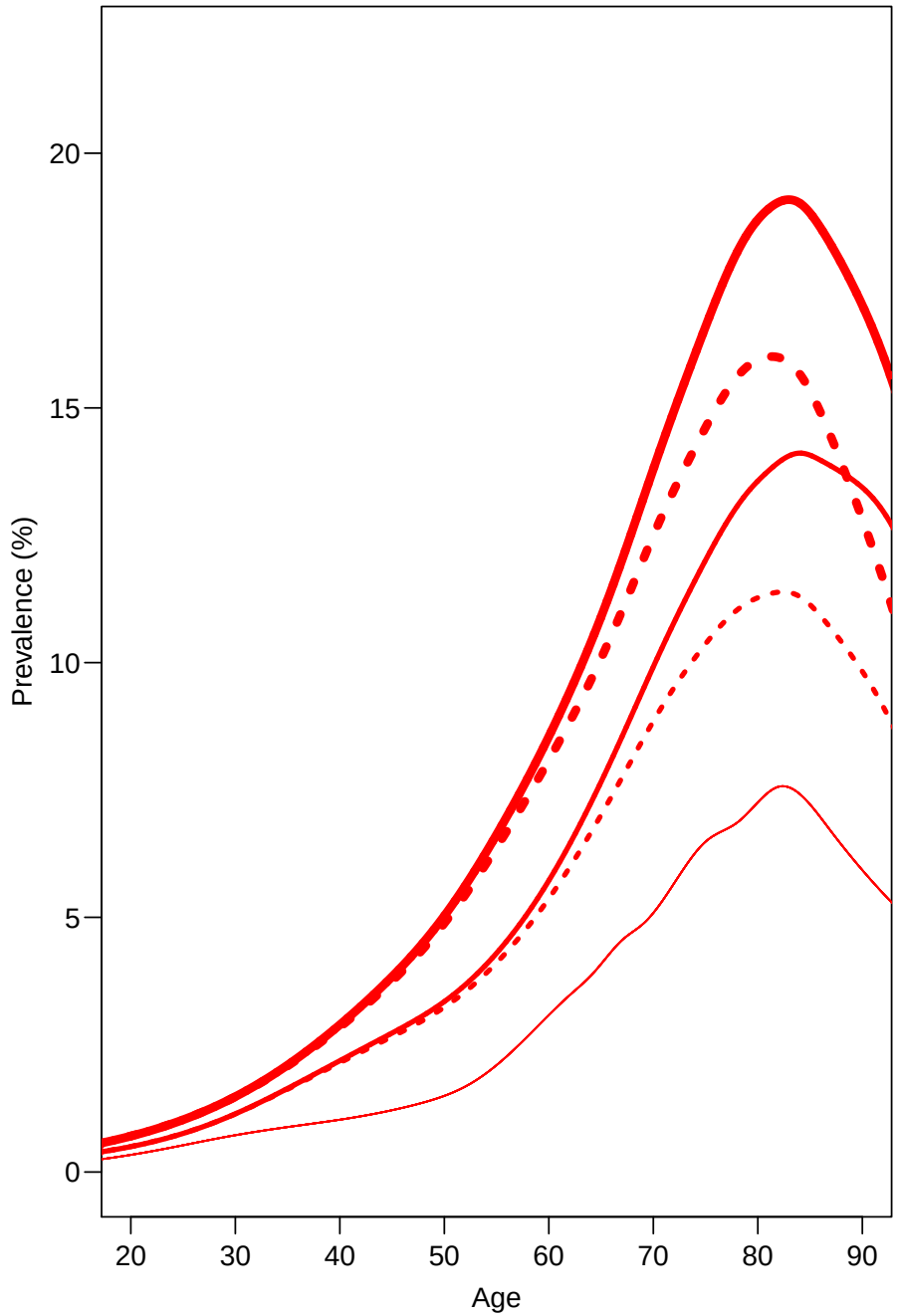
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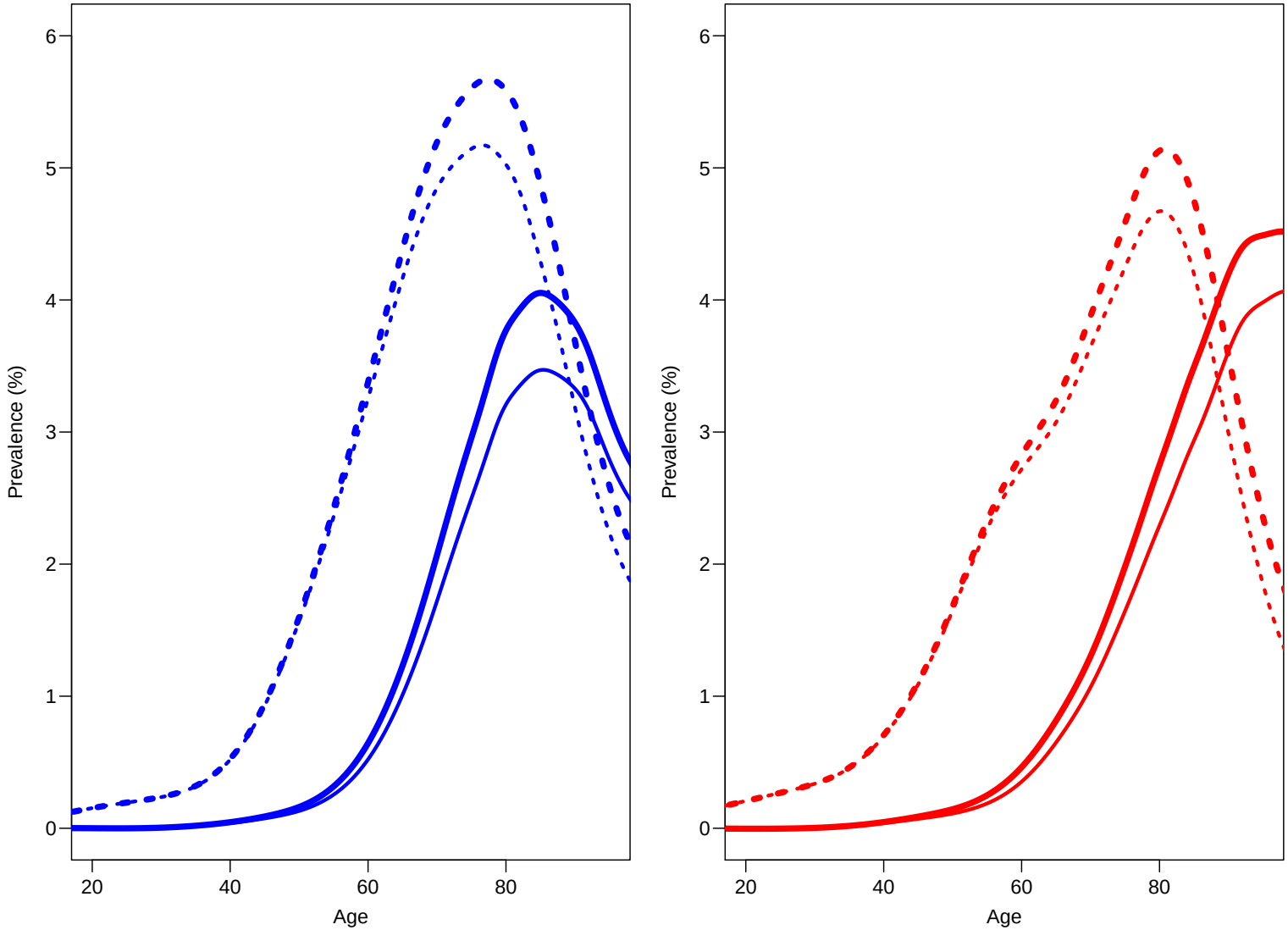
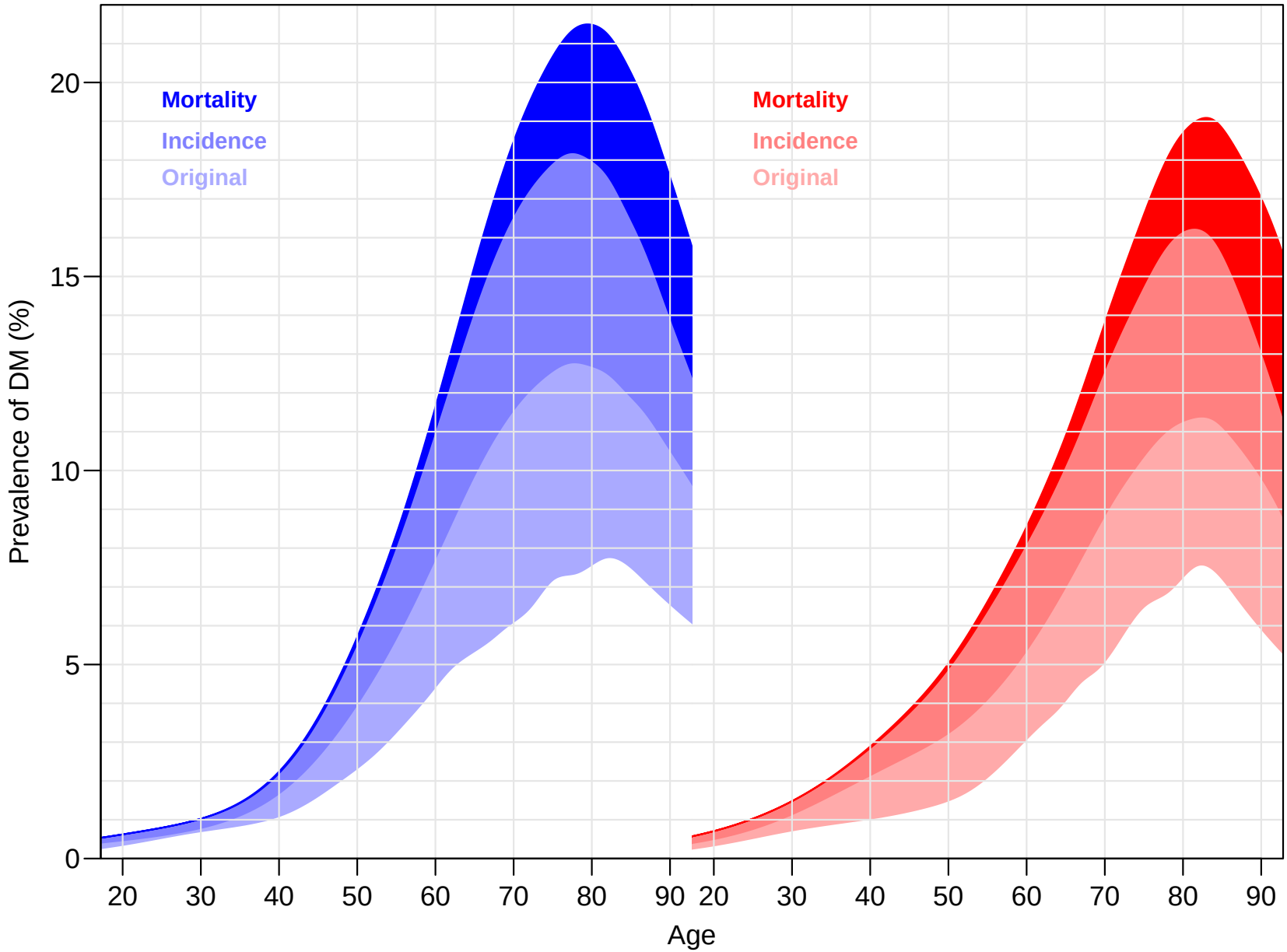


Attributable parts of prevalence:
Full: Mortality; Broken: Incidence.

Age-specific prevalences, 2012:



How many patients?

Recover the **number** of patients in each group by multiplying by the corresponding population size.

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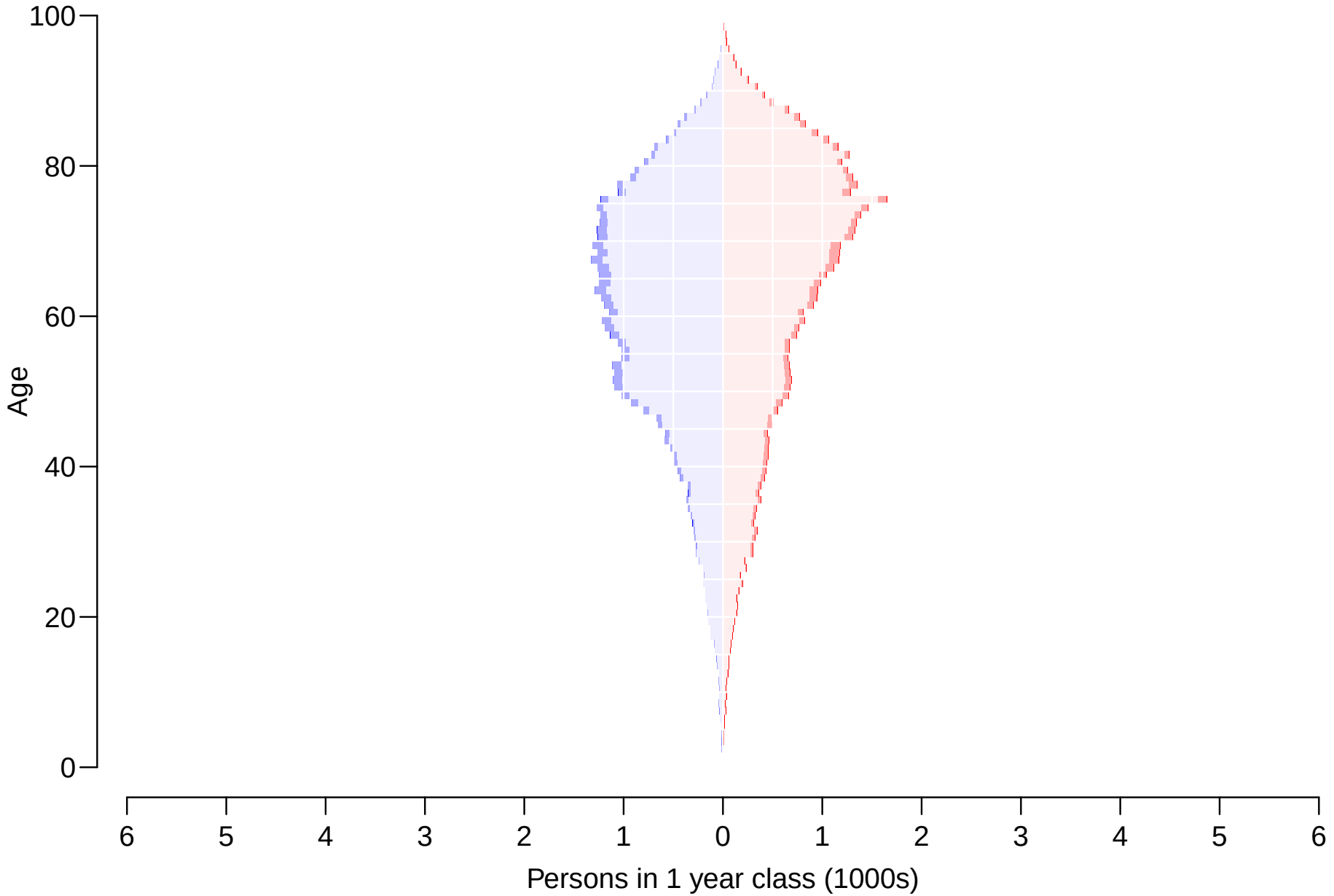
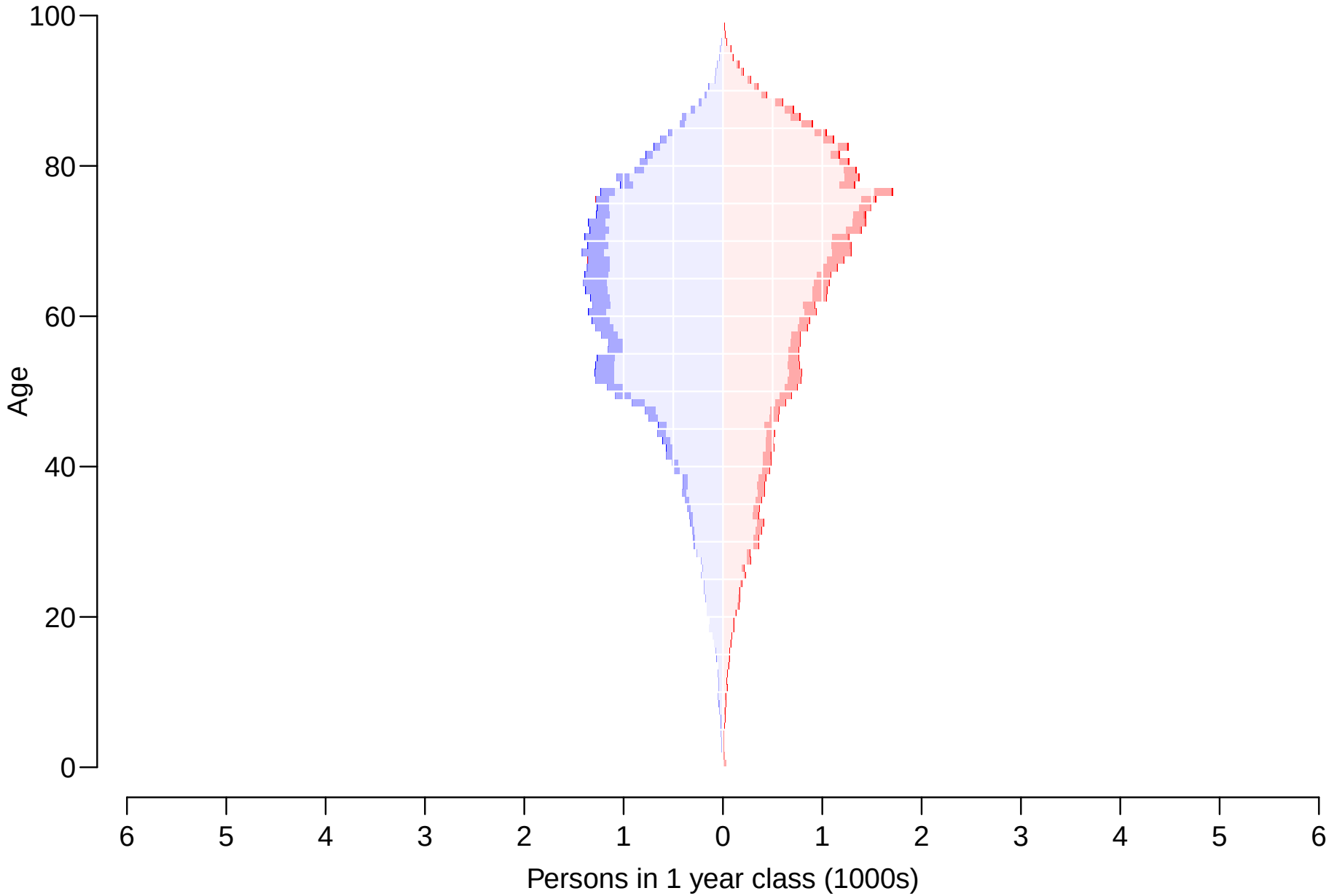
1996

Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
45	58	3,623	49,718	53,443	N	52,631	49,102	3,405	62	62
0.1	0.1	6.8	93.0		%		93.3	6.5	0.1	0.1



1997

Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
189	246	7,062	50,242	57,739	N	56,551	49,427	6,601	263	260
0.3	0.4	12.2	87.0		%		87.4	11.7	0.5	0.5



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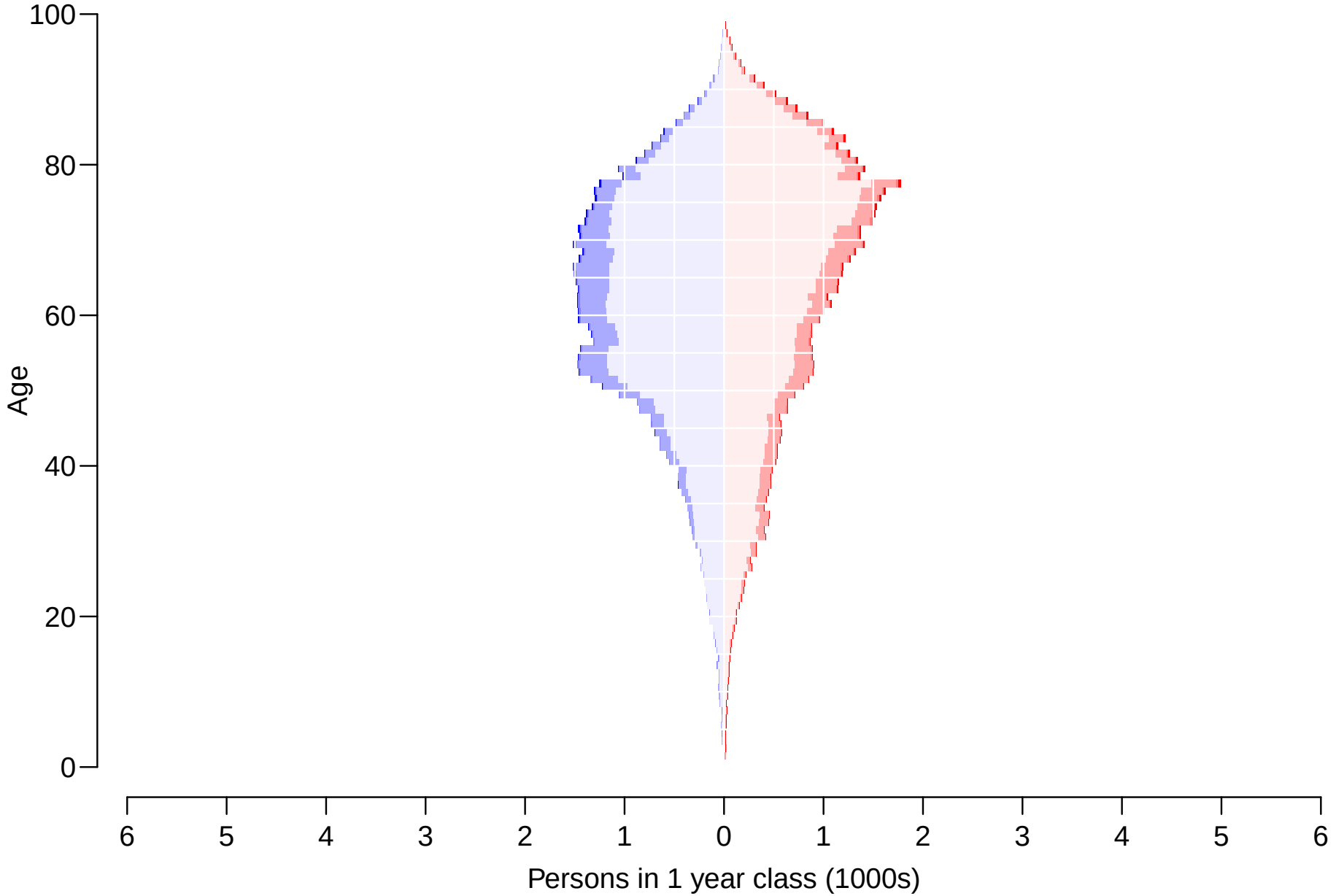
Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
430	591	10,246	50,564	61,832	N	60,522	49,625	9,681	636	581
0.7	1.0	16.6	81.8		%		82.0	16.0	1.1	1.0



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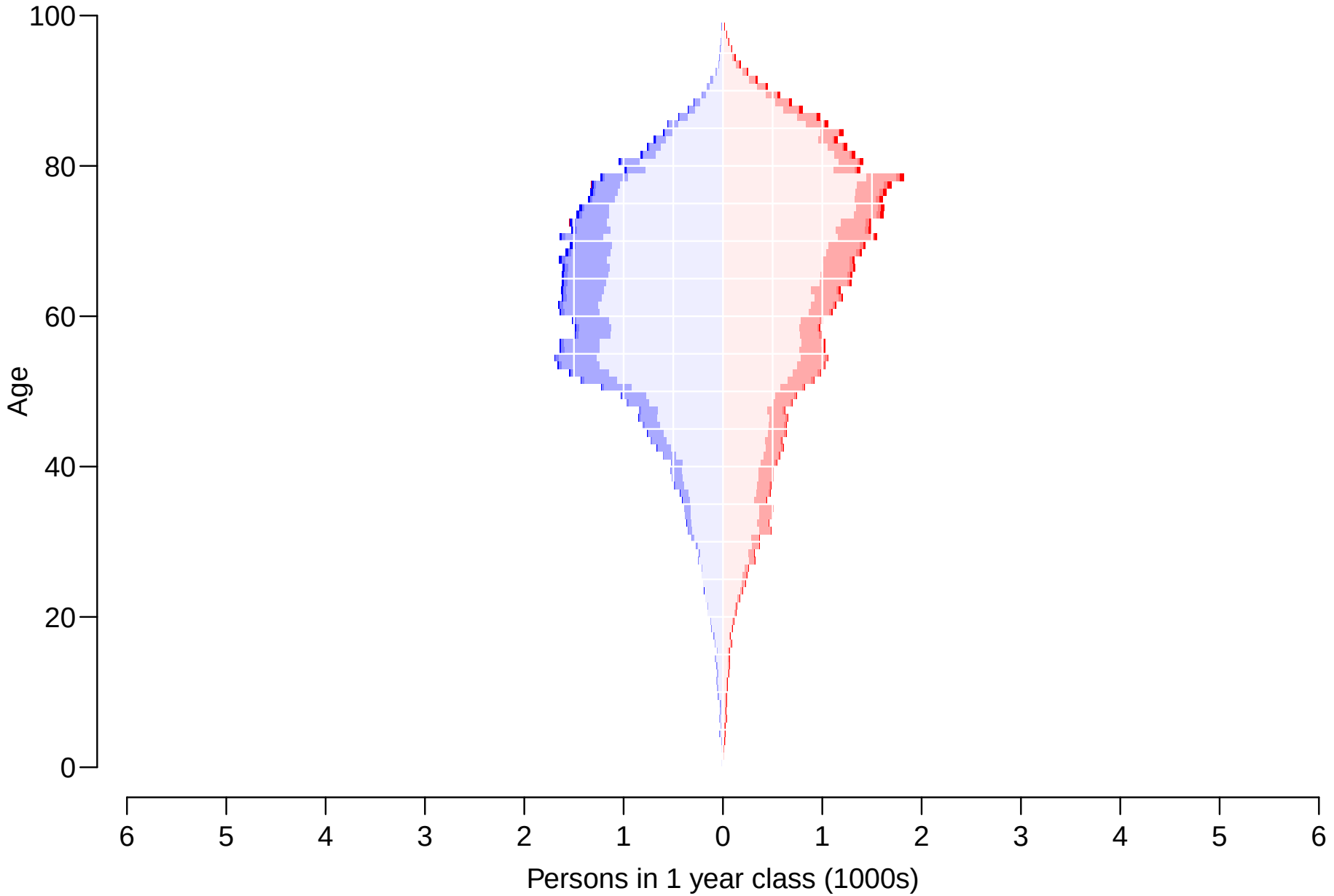
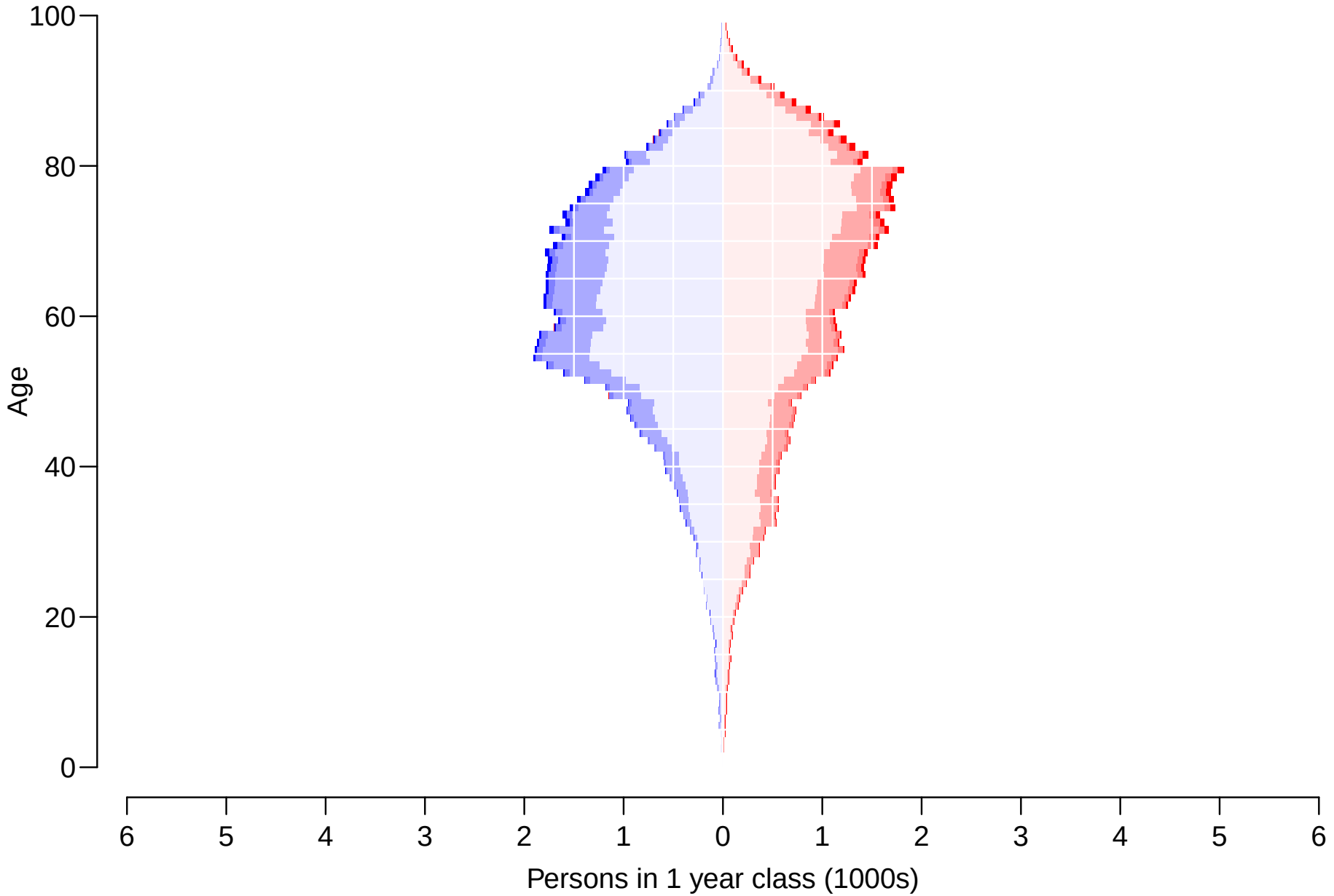
767	1,189	13,374	51,417	66,746	N	64,974	50,046	12,640	1,273	1,015
1.1	1.8	20.0	77.0		%		77.0	19.5	2.0	1.6



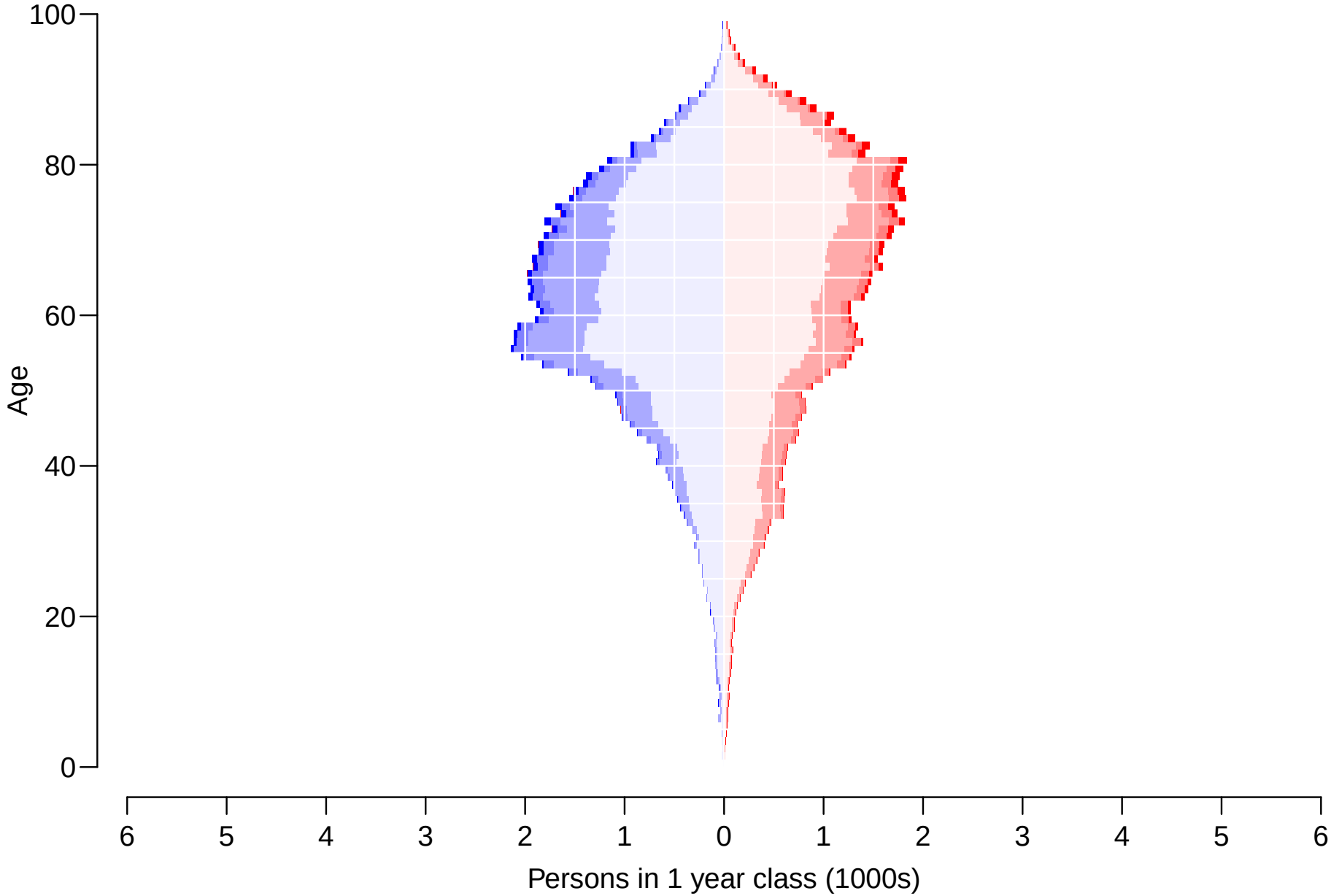
2000

Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
1,181	2,187	16,339	52,091	71,798	N	69,692	50,395	15,430	2,335	1,533
1.6	3.0	22.8	72.6		%		72.3	22.1	3.3	2.2



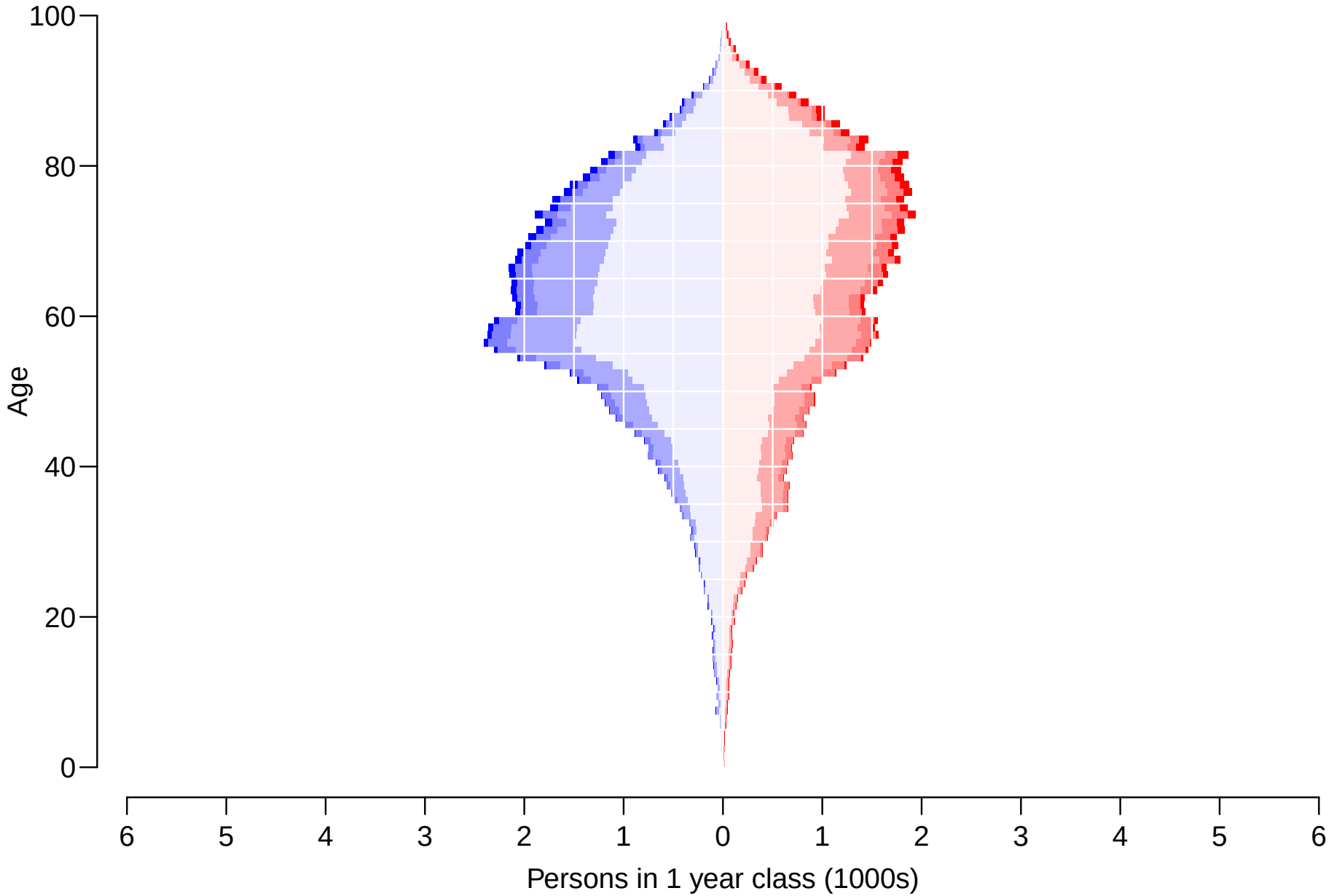
2001

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	1,660	3,765	19,087	52,608	77,120	N	74,570	50,489	17,978	4,006	2,097
	2.2	4.9	24.7	68.2		%		67.7	24.1	5.4	2.8



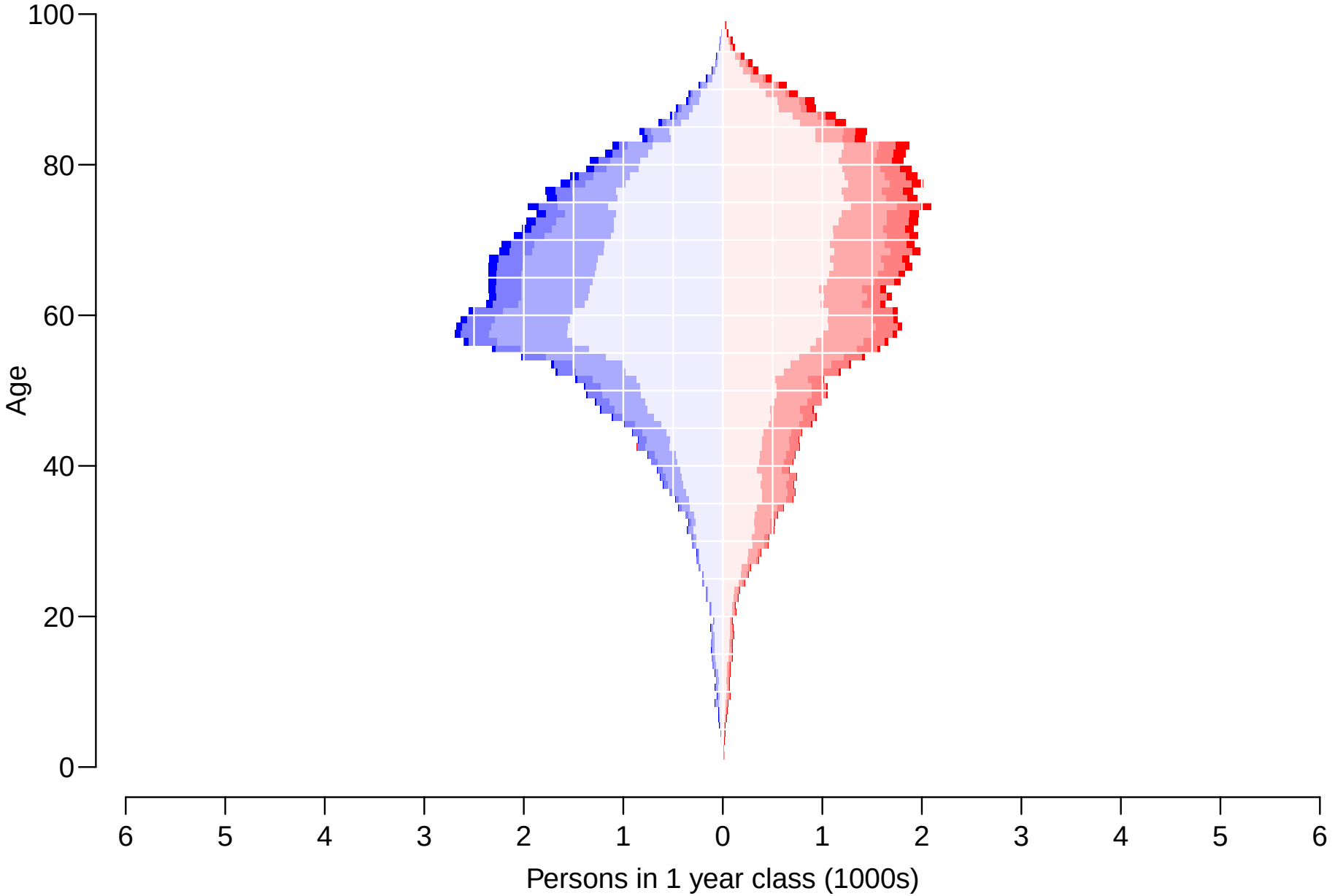
2002

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	2,196	6,005	21,680	53,034	82,914	N	79,895	50,498	20,339	6,362	2,697
	2.6	7.2	26.1	64.0		%		63.2	25.5	8.0	3.4



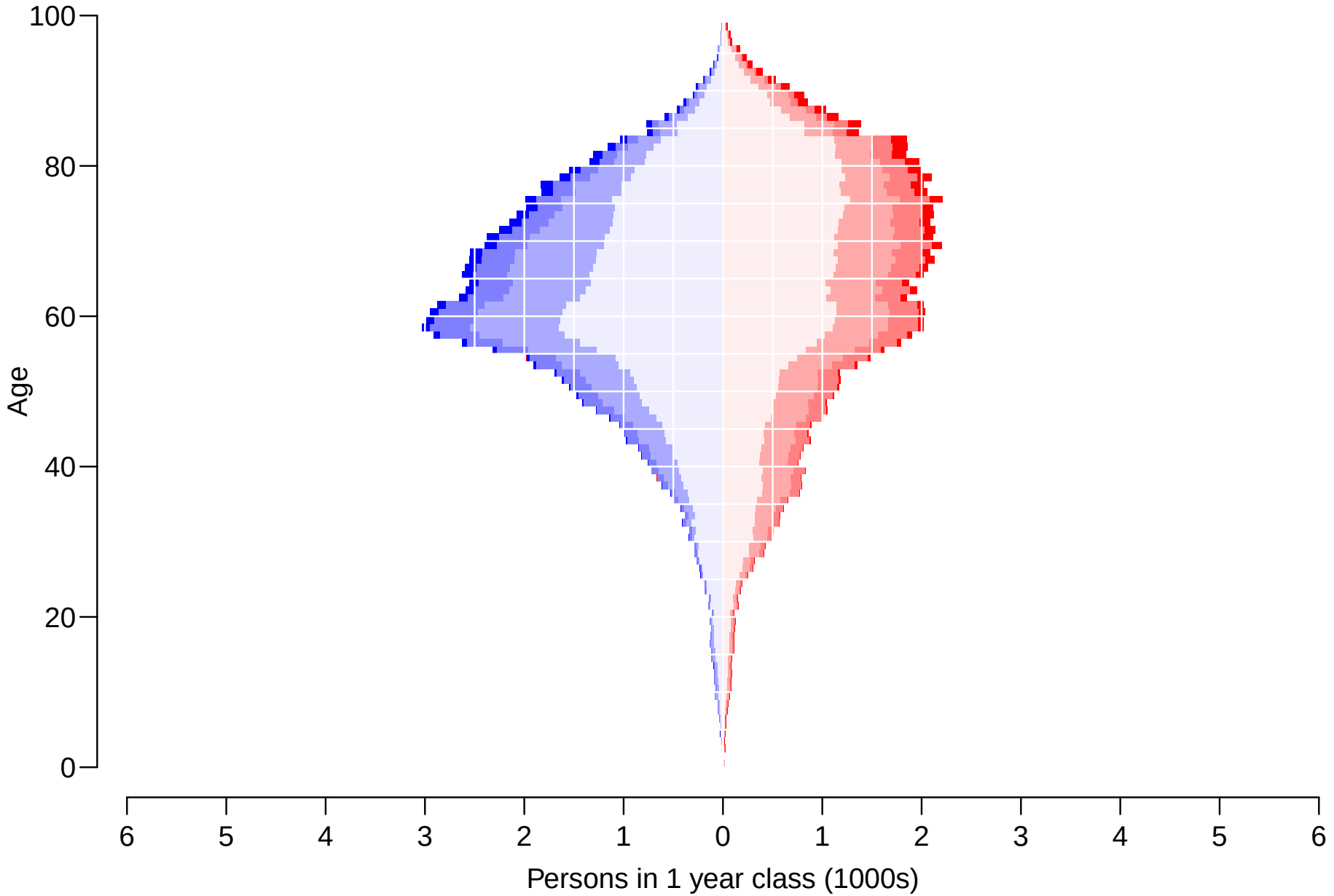
2003

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	2,809	8,808	24,143	53,531	89,291	N	86,364	50,890	22,759	9,359	3,356
	3.1	9.9	27.0	60.0		%		58.9	26.4	10.8	3.9



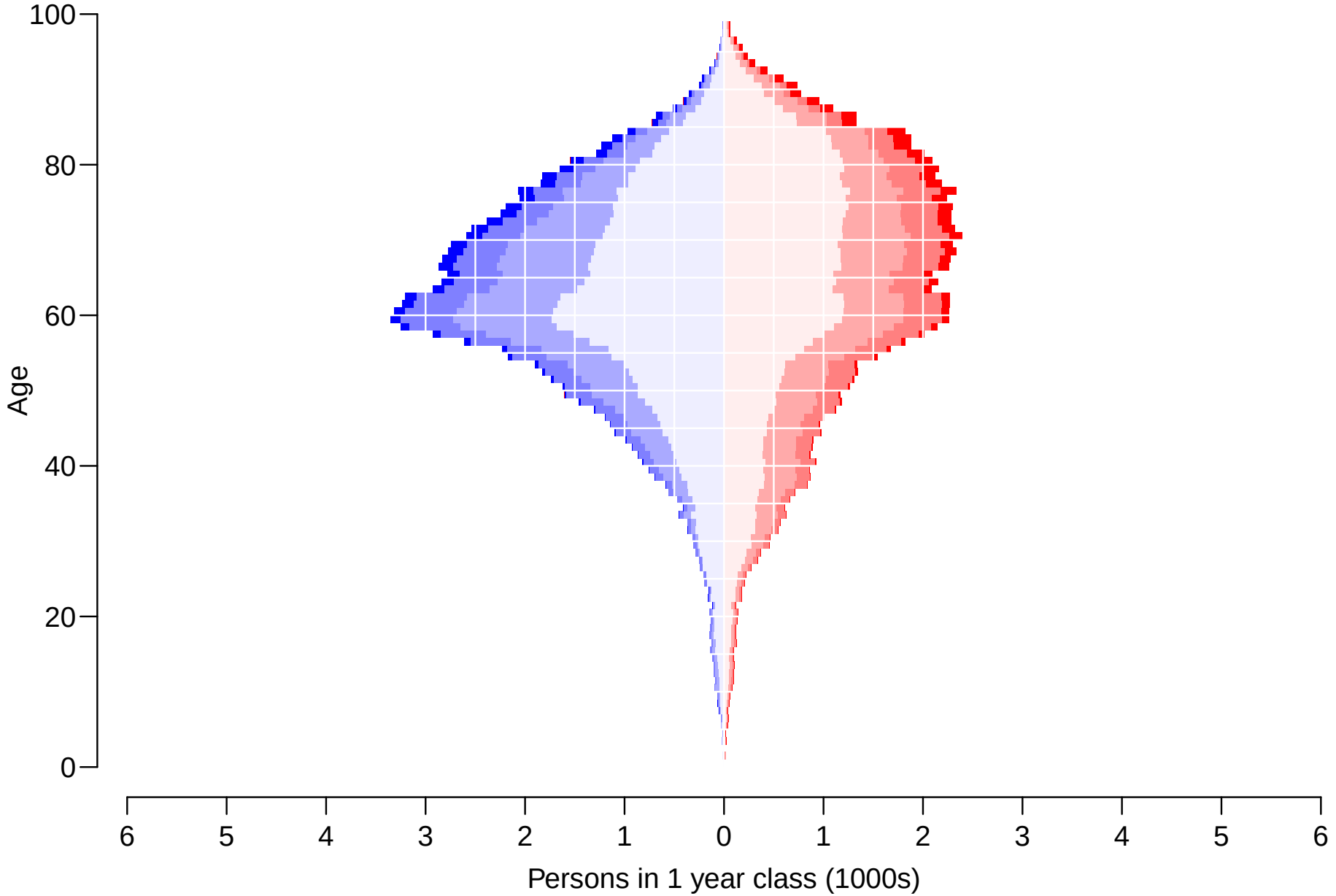
2004

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	3,555	11,954	26,716	54,481	96,706	N	93,199	51,380	25,082	12,649	4,088
	3.7	12.4	27.6	56.3		%		55.1	26.9	13.6	4.4



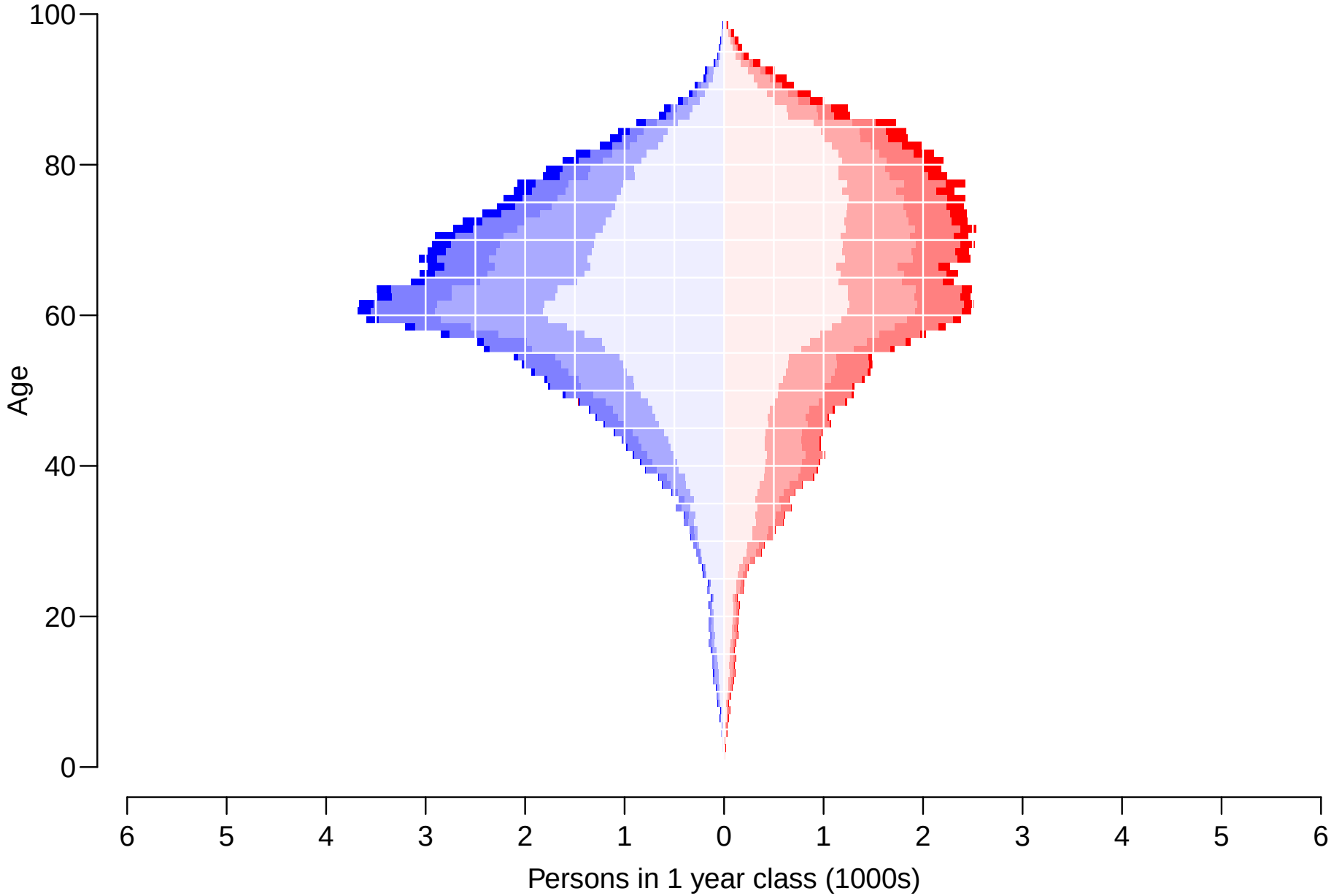
2005

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	4,442	15,062	29,215	55,430	104,149	N	100,227	52,003	27,400	15,886	4,939
	4.3	14.5	28.1	53.2		%		51.9	27.3	15.8	4.9



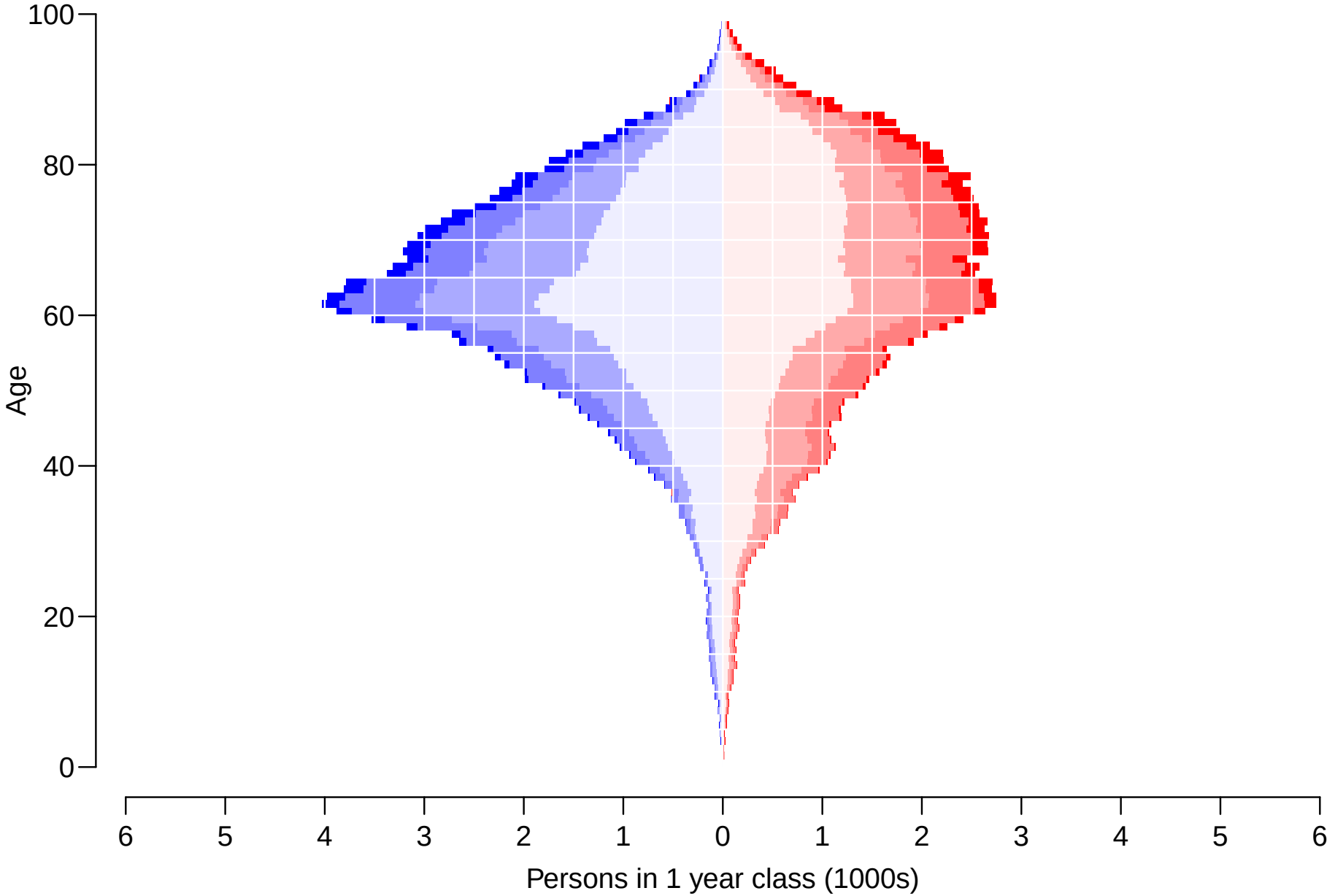
2006

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	5,422	17,861	31,368	55,930	110,581	N	106,028	52,118	29,361	18,735	5,814
	4.9	16.2	28.4	50.6		%		49.2	27.7	17.7	5.5



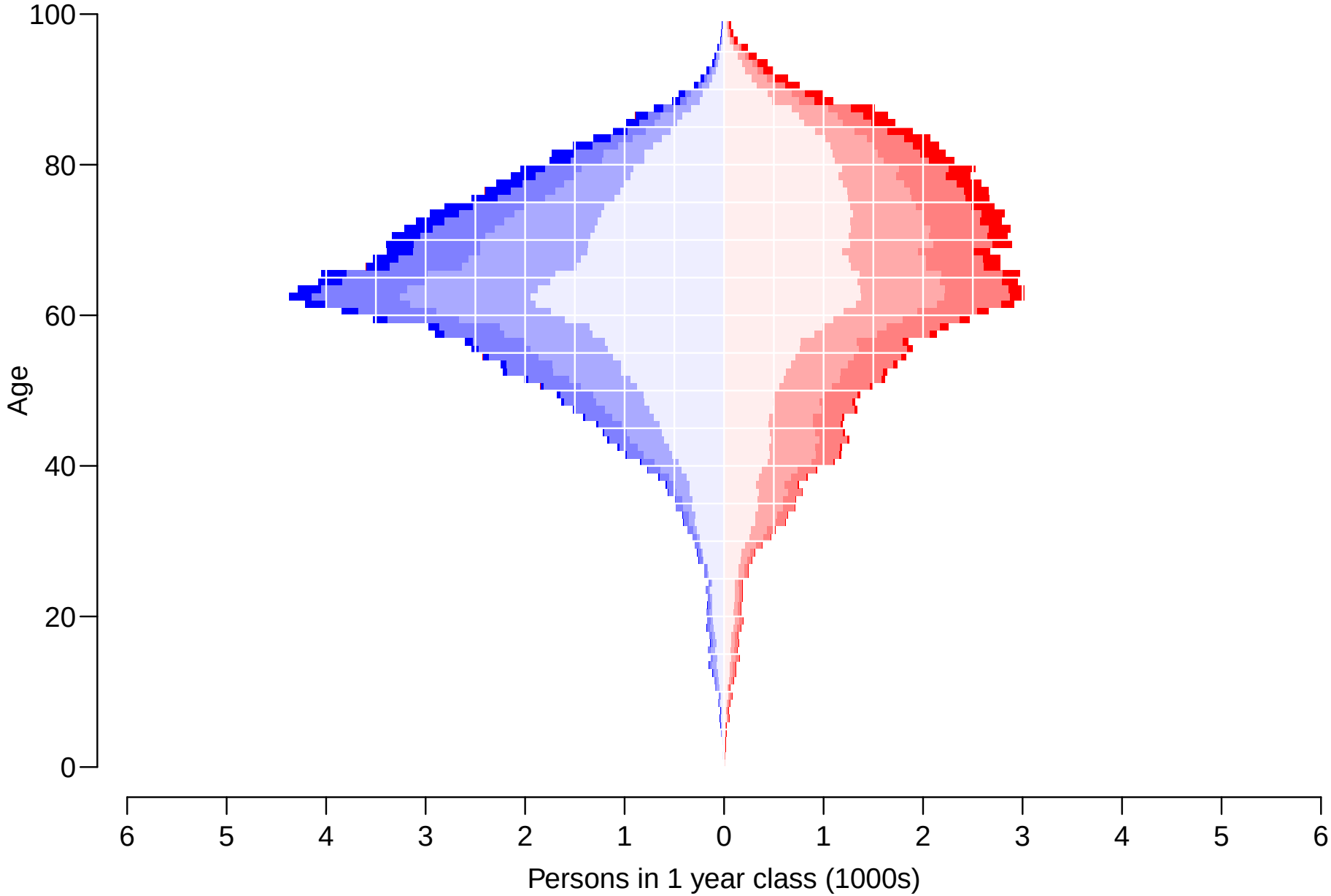
2007

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	6,525	20,655	33,522	56,626	117,328	N	112,018	52,419	31,330	21,504	6,765
	5.6	17.6	28.6	48.3		%		46.8	28.0	19.2	6.0



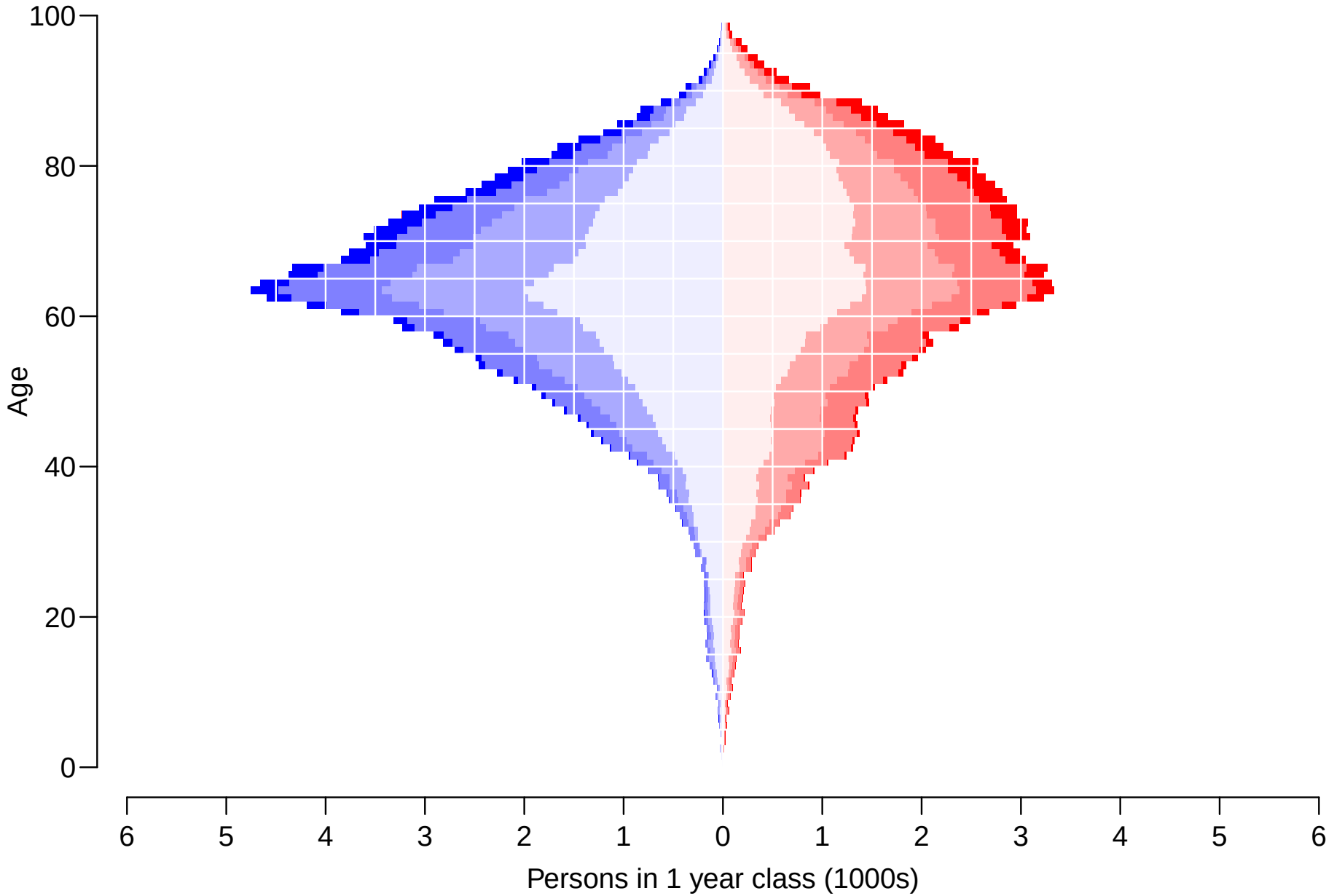
2008

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	7,733	23,708	35,638	57,423	124,501	N	118,726	53,017	33,381	24,539	7,789
	6.2	19.0	28.6	46.1		%		44.7	28.1	20.7	6.6



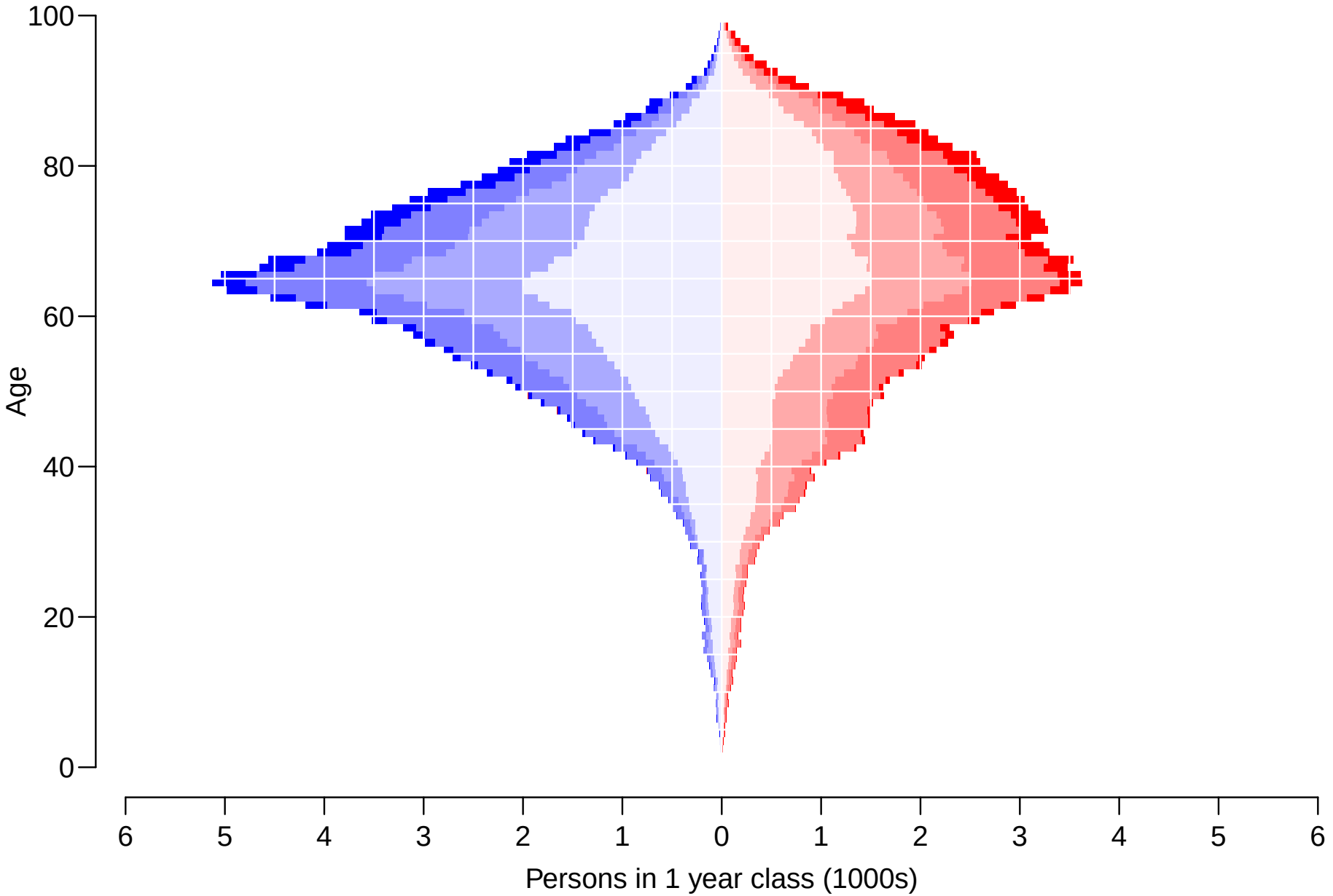
2009

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
	9,047	27,407	37,871	58,522	132,847	N	126,295	53,795	35,515	28,081	8,904
	6.8	20.6	28.5	44.1		%		42.6	28.1	22.2	7.0



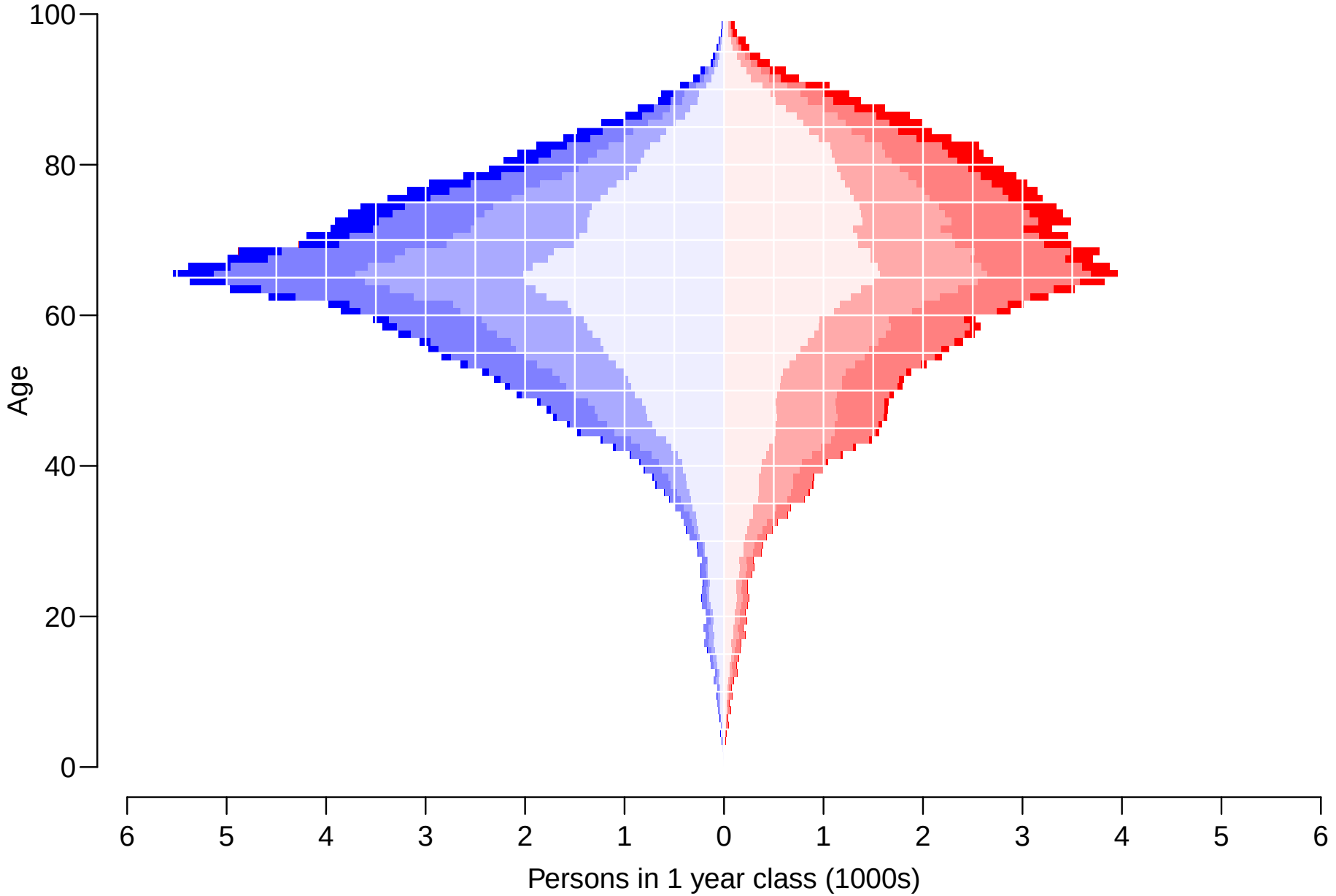
2010

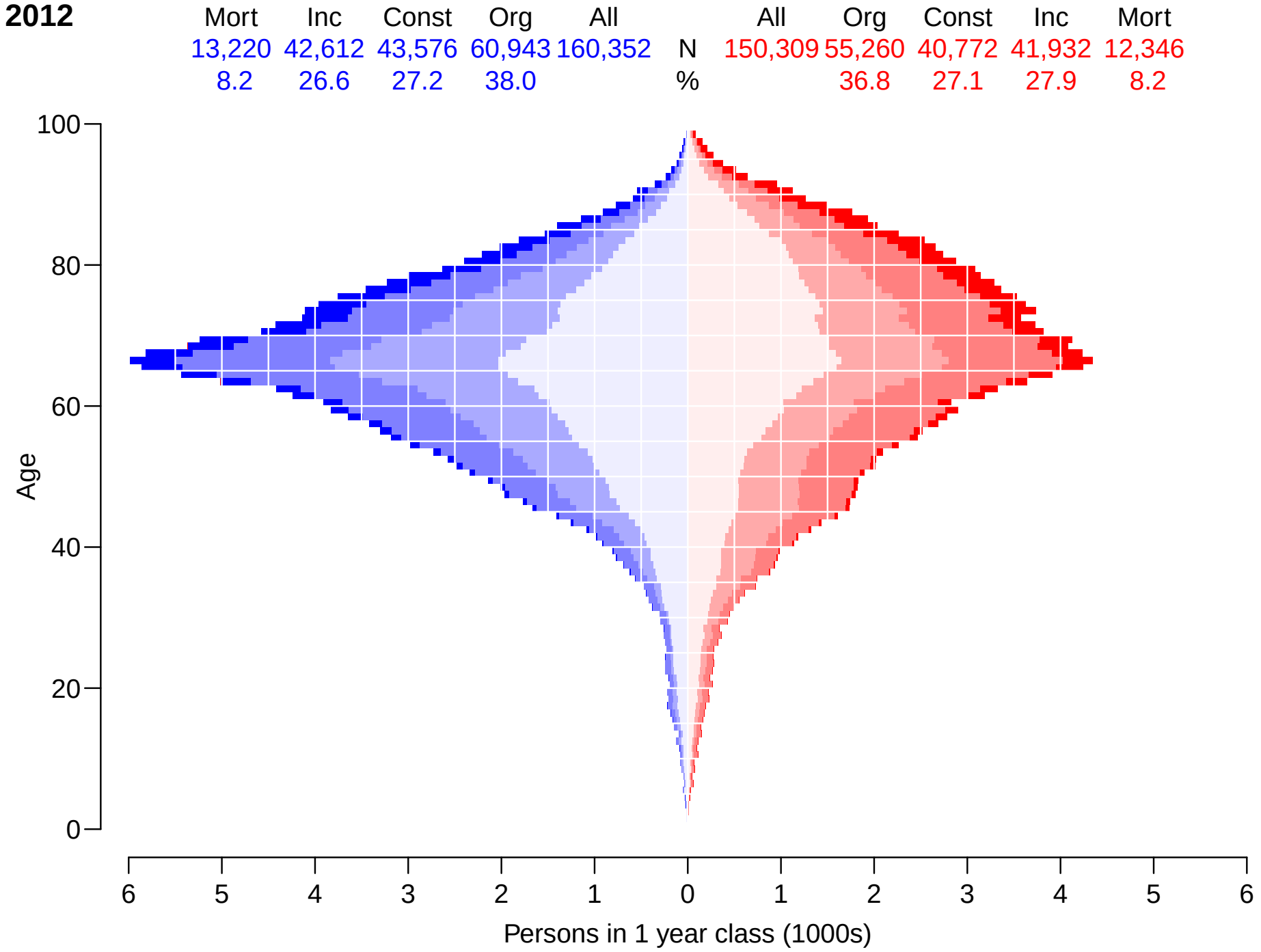
	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
N	10,338	31,611	39,770	59,221	140,940	N	133,318	54,138	37,251	31,954	9,975
%	7.3	22.4	28.2	42.0		%		40.6	27.9	24.0	7.5

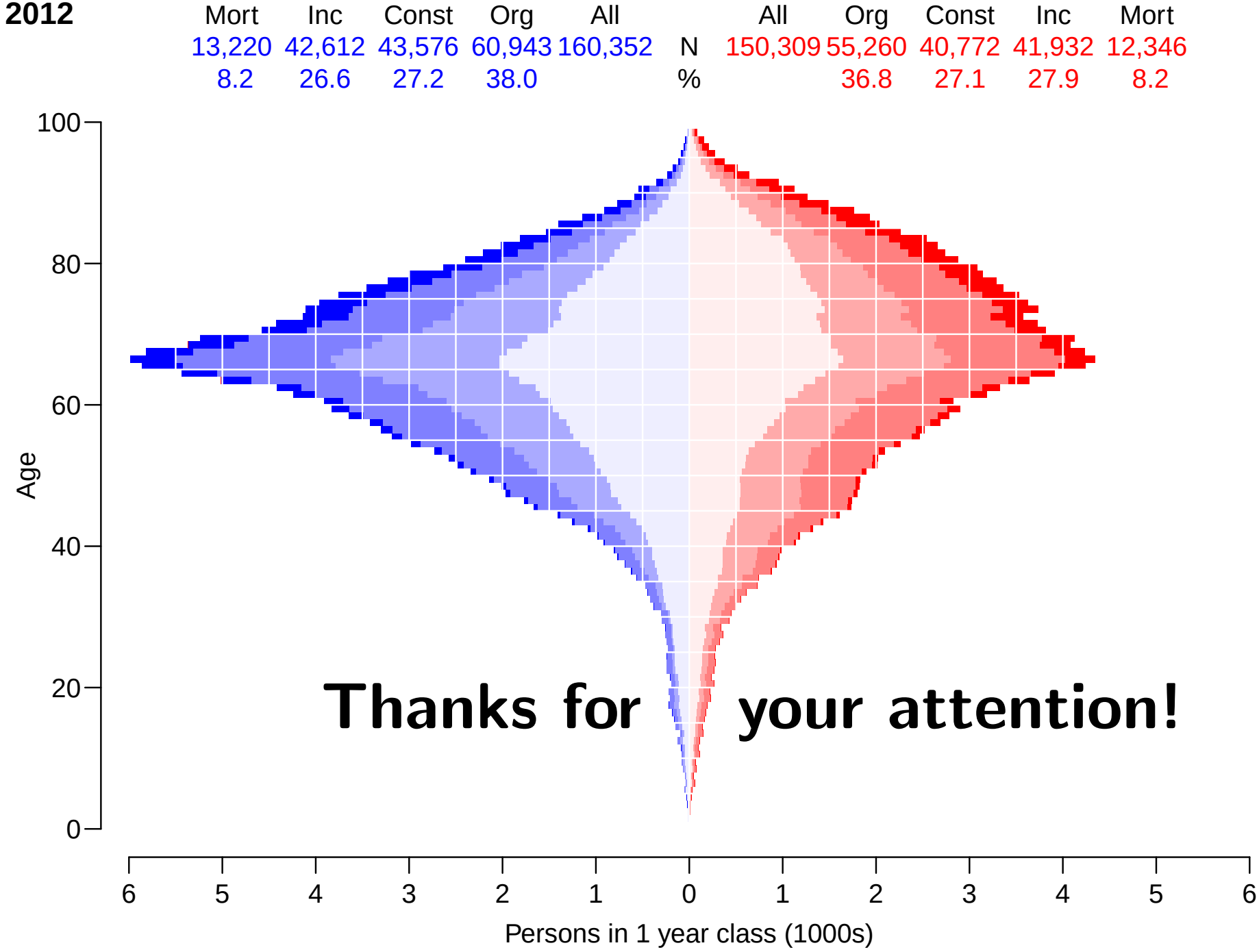


2011

	Mort	Inc	Const	Org	All		All	Org	Const	Inc	Mort
N	11,686	36,566	41,558	59,892	149,702	N	140,507	54,306	38,802	36,354	11,045
%	7.8	24.4	27.8	40.0		%		38.7	27.6	25.9	7.9




2012
Mort Inc Const Org All N All Org Const Inc Mort
13,220 42,612 43,576 60,943 160,352 150,309 55,260 40,772 41,932 12,346
8.2 26.6 27.2 38.0 % 36.8 27.1 27.9 8.2
100
80
60
40
20
0
Age
6 5 4 3 2 1 0 1 2 3 4 5 6
Persons in 1 year class (1000s)


2012
Mort Inc Const Org All
13,220 42,612 43,576 60,943 160,352 N
8.2 26.6 27.2 38.0 %
All Org Const Inc Mort
150,309 55,260 40,772 41,932 12,346
36.8 27.1 27.9 8.2
100
80
60
40
20
0
Age
Thanks for your attention!
6 5 4 3 2 1 0 1 2 3 4 5 6
Persons in 1 year class (1000s)