Heart. Author manuscript; available in PMC 2020 January 01.

Published in final edited form as:
Heart. 2020 January ; 106(1): 6–7. doi:10.1136/heartjnl-2019-315708.

Declining cardiovascular mortality masks unpalatable inequalities

Alastair H Leyland, **Ruth Dundas**
MRC/CSO Social and Public Health Sciences Unit, University of Glasgow

Abstract

Cardiovascular disease mortality is falling across Europe, and is falling in most social groups. The impact of these declines on inequalities in cardiovascular mortality is, however, unclear. We project current mortality declines into the future and make the case that, under different scenarios, the inequalities that will be seen in the future are in general worse than at present and, as such, unacceptable. We argue that population level policy interventions on risk factors stand the best chance of reducing inequalities.

Keywords

Coronary artery disease < DISEASES; Epidemiology < RESEARCH APPROACHES; Global health < RESEARCH APPROACHES

Mortality from cardiovascular disease is declining in many European countries, but they remain socially patterned. Di Girolamo and colleagues investigate how inequalities in cardiovascular mortality have changed in 12 countries since the 1990s.[1] In general they appear cautiously optimistic, describing trends in such inequalities as “favourable overall” whilst noting that further improvement is an important aspiration.

The paper raises an interesting (and old) question: which are more important, relative or absolute inequalities? The authors present both, which is good practice. It is not possible to summarise the distribution of mortality across social groups in a single number, no matter how much we might wish this to be the case. This fact is recognised by some policymakers; in Scotland, for example, the long term monitoring of health inequalities[2] includes publication of the relative index of inequality (detailing the magnitude of the inequality gradient), the absolute gap (the difference between groups at the extremes of the social spectrum), and the scale (indicating the magnitude of the problem).

To gauge the extent to which current trends should be regarded as favourable we can examine future mortality. Di Girolamo et al provide the means to project cardiovascular disease mortality rates by occupational class (based on their Supplementary Tables S7 and S10). In Table 1 we present various scenarios enabling us to look at potential future inequalities for upper non-manual employees and manual workers.

Firstly, if we assume that mortality rates continue with the *absolute* declines experienced between 1990-1994 and 2010-2014, based on the most recent reported rates the mortality rate in upper non-manual employees will fall to zero in most countries between 4 and 16

Europe PMC Funders Author Manuscripts

years. (The exception is Lithuania where the very slow decline seen between 2000-2004 and 2010-2014 of under 1 per 100,000 means that it would take nearly 400 years to fall to zero.) In Italy (Turin) the mortality rate for manual workers will fall to zero at about the same time as for upper non-manual employees; in other countries it will take 2-6 years longer for the rate in manual workers to fall to zero than for upper non-manual employees. (The exception is again Lithuania, where an increasing mortality rate among manual workers means that its projection will never reach zero.) Although these are not big differences, it means that there are periods during which cardiovascular disease between 35 and 64 years becomes a disease of the poor and therefore relative inequalities – measured using a simple ratio of the mortality rates in the two groups – are infinite.

Under a potentially more realistic scenario we assume that the *relative* declines in mortality experienced between 1990-1994 and 2010-2014 will continue. By 2020-2024 absolute inequalities (the difference between the two groups) will have decreased in every country apart from Lithuania, the difference falling to as little as 10 or 15 per 100,000 in Italy (Turin) and Austria respectively. Relative inequalities, however, will increase in every country apart from Italy (Turin). In Finland, for example, the mortality rate in manual workers will be more than three times that in upper non-manual employees.

What do these future scenarios tell us about the importance of absolute and relative inequalities, and of progress towards the reduction of inequalities? Whatever the absolute level of reduction, a disease becoming the sole preserve of the more disadvantaged is not a desirable situation and does not suggest progress. On the other hand, faster relative reductions in the more advantaged groups mean that it will take longer for the mortality rate of the disadvantaged group to fall by a fixed proportion. Again, if the mortality rate among upper non-manual employees in Finland will halve in 14 years while it will take 19 years for the mortality rate to halve among manual workers – and that from a considerably higher starting point – then it is difficult to describe this as progress in reducing inequalities.

So continuing down the same path is unlikely to lead to a favourable situation in most countries. Something needs to change if relative inequalities are to decrease. Recent declines in mortality from coronary heart disease in Scotland are almost equally attributable to improvements in medical treatment and reductions in risk factors.[3] It is not enough for these to be experienced equally across social groups if we are to see inequalities fall; future declines in mortality must be more pronounced among the more disadvantaged. An effective and fair health system will be responsive to the needs of its population regardless of social circumstances; perhaps the greatest opportunity for medical care to reduce inequalities is if more disadvantaged groups are encouraged to seek healthcare earlier in the progress of the disease. The greatest opportunity to reduce inequalities, however, must be through the modification of lifestyle risk factors including smoking, alcohol consumption, diet and physical activity. These can bring about rapid change,[4] show strong social patterning and are amenable to population wide intervention such as through policy.[5,6]

We know that the most successful preventive measures (and those most likely to reduce inequalities) are those that change environments at the whole population level rather than individual behaviours.[7] Using tobacco reduction as an example, it was known for many

years that smoking was detrimental to health but, despite many individual behaviour change interventions delivered through the health service, smoking prevalence remained high, and higher among more disadvantaged groups. It was not until smoking bans in public places were introduced, which impacted at a population level and on everyone in the population equally, that larger reductions in smoking prevalence and subsequent mortality from smoking related causes were seen.[8]

But even risk factor reductions have the potential to disappoint. We have seen, for example, the levels of alcohol-related harms to be greater in more disadvantaged groups at given levels of alcohol consumption.[9] Such effect modification means that an even greater reduction in risk factors in the more disadvantaged groups will be needed to produce the larger reduction in mortality rate needed to decrease inequalities.

Cardiovascular disease contributes substantially to overall inequalities in mortality, and as such reducing inequalities in cardiovascular mortality is an important part of the fight against inequalities. Di Girolamo et al show that cardiovascular mortality has reduced substantially over the past 20 years, but remains strongly patterned such that faster declines are seen among the better off. If the current trends continue, without any additional interventions in the more disadvantaged groups, it will take between 8 and 28 years in most countries for cardiovascular disease mortality among manual workers to fall to the levels currently experienced by upper non-manual employees. Is this fair?

Acknowledgement

The Social and Public Health Sciences Unit is funded by the Medical Research Council (MC_UU_12017/13) and the Scottish Government Chief Scientist Office (SPHSU13).

References

[1]. Di Girolamo C, Nusselder W, Bopp M, Brønnum-Hansen H, Costa G, Kovacs K, et al. Progress in reducing inequalities in cardiovascular disease mortality in Europe. Heart.

[2]. Scottish Government. Long-term monitoring of health inequalities. December 2018 report. Edinburgh: Scottish Government; 2018. Available from: https://www.gov.scot/publications/long-term-monitoring-health-inequalities-december-2018-report/

[3]. Hotchkiss JW, Davies CA, Dundas R, Hawkins N, Jhund PS, Scholes S, et al. Explaining trends in Scottish coronary heart disease mortality between 2000 and 2010 using $IMPACT_{SEC}$ model: retrospective analysis using routine data. BMJ. 2014; 348:g1088. [PubMed: 24503058]

[4]. Capewell S, O'Flaherty M. Rapid mortality falls after risk-factor changes in populations. Lancet. 2011; 378:752–753. [PubMed: 21414659]

[5]. Marmot M, Bell R. Social determinants and non-communicable diseases: time for integrated action. BMJ. 2019; 364:I251.

[6]. Marteau TM, White M, Rutter H, Petticrew M, Mytton OT, McGowan JG, Aldridge RW. Increasing healthy life expectancy equitably in England by 5 years by 2035: could it be achieved? Lancet. 2019; 393:2571–2573. [PubMed: 31258113]

[7]. Capewell S, Capewell A. An effectiveness hierarchy of preventive interventions: neglected paradigm or self-evident truth? Journal of Public Health. 2017; 40:350–358.

[8]. Lee PN, Fry JS, Thornton AJ. Updating the evidence relating smoking bans to incidence of heart disease. Regulatory Toxicology and Pharmacology. 2019; 101:172–186. [PubMed: 30500390]

[9]. Katikireddi SV, Whitley E, Lewsey J, Gray L, Leyland AH. Socioeconomic status as an effect modifier of alcohol consumption and harm: an analysis of linked cohort data. Lancet Public Health. 2017; 2:e267–e276. [PubMed: 28626829]

Europe PMC Funders Author Manuscripts

Europe PMC Funders Author Manuscripts

Table 1

Projected scenarios for upper non-manual employees and manual workers under assumptions that absolute or relative changes in cardiovascular disease mortality are maintained

					Absolute change projected		Relative change projected			
		Mortality 2010-14[a]	Absolute annualised change	Relative annualised change	Years to zero[c]	Difference[d]	Projected mortality 2020-24	Years to fall 50%[e]	Difference[d]	Years to fall to UNM[f]
Finland	Upper non-manual	69.7	-5.7	-4.8	12.2	6.5	42.6	14.1	4.8	0
	Manual	192.8	-10.3	-3.6	18.7		133.6	18.9		27.8
Denmark	Upper non-manual	49.6	-4.5	-5.5	11.0	5.0	28.2	12.3	3.5	0
	Manual	108.7	-6.8	-4.3	16.0		70.0	15.8		17.9
England & Wales	Upper non-manual	59.6	-7.8	-6.5	7.6	2.3	30.4	10.3	1.7	0
	Manual	103.6	-10.4	-5.6	10.0		58.2	12.0		9.6
Austria	Upper non-manual	53.5	-3.3	-3.9	16.2	2.5	35.9	17.4	1.5	0
	Manual	73	-3.9	-3.6	18.7		50.6	18.9		8.5
Switzerland	Upper non-manual	50.6	-3.7	-4.5	13.7	4.4	31.9	15.1	3.3	0
	Manual	114.1	-6.3	-3.7	18.1		78.3	18.4		21.6
Italy (Turin)	Upper non-manual	56.6[b]	-6.6	-3.8	3.6	-0.4	31.7	17.9	-1.3	0
	Manual	77.7[b]	-9.5	-4.1	3.2		41.5	16.6		2.6
Estonia	Upper non-manual	149	-13.3	-6	11.2	5.9	80.3	11.2	4.2	0
	Manual	354.4	-20.7	-4.4	17.1		226.0	15.4		19.3
Lithuania	Upper non-manual	271.4	-0.7	-0.3	387.7	-	263.4	230.7	-	0
	Manual	547.5	0.4	0.1	-		553.0	-		-

[a] Age standardised cardiovascular disease mortality rates per 100,000 person years, men, 35-64 years

[b] Rates for Turin relate to 2005-09

Europe PMC Funders Author Manuscripts

[c] Number of years taken from 2010-14 for mortality rate to fall to zero, assuming absolute annualised changes persist

[d] Additional years required for manual workers over upper non-manual employees

[e] Number of years taken from 2010-14 for mortality rate to fall by 50%, assuming relative annualised changes persist

[f] Number of years taken from 2010-14 for mortality rate to fall to that experienced by upper non-manual employees in 2010-14