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# Mortality Amenable to Health Care in 31 OECD Countries

## ESTIMATES AND METHODOLOGICAL ISSUES

Juan G. Gay, Valérie Paris,
Marion Devaux, Michael de Looper

JEL Classification: I10, I12

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## Health Working Papers

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**DIRECTORATE FOR EMPLOYMENT, LABOUR AND SOCIAL AFFAIRS**

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**ABSTRACT**

This study assesses the potential of the concept of "mortality amenable to health care" as an indicator of outcome for health care systems. It presents estimates of the mortality amenable to health care in 31 OECD countries for the period 1997-2007. It measures the sensitivity of this indicator to the list of death causes considered to be "amenable to care" by comparing results obtained from two leading lists. It then presents the advantages of this indicator over indicators of general mortality, as well as its limitations.

**RÉSUMÉ**

Cette étude évalue dans quelle mesure l'indicateur de « mortalité évitable grâce au système de soins » peut être utilisé comme indicateur de résultat du système de soins. Elle présente des estimations de cette mortalité évitable par les soins pour 31 pays de l'OECD et pour la période 1997-2007. Elle mesure la sensibilité de l'indicateur à la liste de causes de décès considérées comme évitables par les soins en comparant les résultats obtenus à partir de deux listes alternatives. Puis, elle présente les avantages de cet indicateur sur les indicateurs de mortalité générale, ainsi que ses limites.

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(*) The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

# 1. INTRODUCTION

1. It is widely agreed that the primary goal of health systems is to improve population health, and that health systems' performance should be assessed, first and foremost, against their contribution to (positive) changes in population health. Such an assessment, however, is a challenging task for many reasons. First, assessing the levels and changes in the health status of populations is not simple. While information on mortality may be readily available in most countries, measuring the health status of the living population is much more complicated. There are many dimensions to health (including both physical and psychological), with each of these dimensions (or at least the most important ones) requiring proper measurement, if the aim is to provide a comprehensive assessment of "health" at the individual or population-wide level. Furthermore, some dimensions of health status are highly subjective and not measurable by incontestable standards. Second, health status does not only depend on health systems interventions; non-medical determinants, such as wealth, socio-economic status, lifestyle and environmental factors, may in fact play a bigger role in determining health status than medical care. Third, the impact of health systems interventions on health status is not always known with certainty, nor measured properly and systematically. Hence, the share of health status improvements that can be unambiguously attributed to health systems is unclear.

2. Aware of these questions but constrained by data availability, analysts have most often used general mortality indicators such as death rates and life expectancies as proxies for health systems outcomes when assessing health systems performance (see Joumard *et al.,* 2008 or OECD, 2010 for a review).

3. In order to provide a more precise measure of the outcomes that may legitimately be attributed to health care interventions, researchers have developed the concept of "mortality amenable to health care". *Amenable mortality* is generally defined as premature deaths that should not occur in the presence of effective and timely care. It takes into account premature deaths for a list of diseases, for which effective health interventions are deemed to exist and might prevent deaths before a certain age limit (usually 75, though sometimes lower).

4. The main objectives of this paper[1] are: to provide estimates of mortality amenable to health care for a large set of OECD countries and to measure the sensitivity of this indicator to the list of causes and age groups selected as "amenable to health care" by comparing two widely-used lists, prepared by Nolte and McKee (2008) and Tobias and Yeh (2009). The paper also compares these two lists with broader measures of life expectancies and potential years of life lost (PYLL), which do not select any particular causes of death, to assess the differences and value-added of indicators of "amenable mortality". It concludes with a brief discussion of the potential and limitations of this indicator in analysing health systems performance.

1. The authors thank Gaetan Lafortune and Mark Pearson for their comments and suggestions.

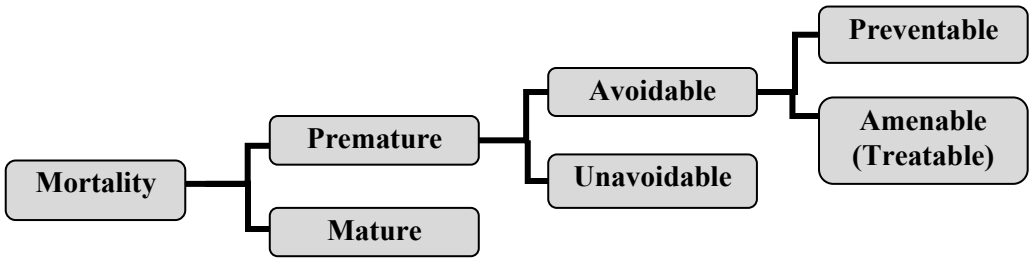
## 2. MORTALITY AMENABLE TO HEALTH CARE: THE CONCEPT AND SELECTION OF CAUSES OF DEATHS

5. Mortality amenable to health care has been defined as "premature deaths that should not occur in the presence of timely and effective health care" (Nolte and McKee, 2008) or as "conditions for which effective clinical interventions exist [that should prevent premature deaths]" (Tobias and Yeh, 2009).

### From avoidable to amenable mortality

6. The concept of mortality amenable to health care finds its origins in the evolution of the concept of avoidable mortality, developed in the 1960s. This evolution, described in detail by Nolte and McKee (2004), can be summarised as follows. Avoidable mortality was developed as an indicator to study the quality of medical care by a group of researchers from Harvard University (Rutstein *et al*, 1976). In their work, *avoidable mortality* was defined as "deaths from selected disease groups which are considered to be either treatable or preventable through health care services". The Harvard group was the first to introduce the term *amenable* mortality, differentiating between causes which are responsive to medical intervention through treatment and secondary prevention (e.g. cervical cancer, hypertension or appendicitis), and causes responsive to actions beyond health *care* services (*preventable* conditions such as lung cancer and liver cirrhosis) (Newey *et al.*, 2004). The relationship between these different concepts of avoidable and amenable mortality is shown in Figure 1.

**Figure 1. The concepts of avoidable and amenable mortality**




Source: Tobias, 2009.

7. Amenable mortality was used by European researchers in the 1980s and 1990s (Mackenbach *et al.*, 1990; Westerling, 1992; Holland *et al.*, 1994), but although efforts in this period were focused on using it as an indicator of the performance of health care systems, these failed to raise significant attention (Nolte and McKee, 2004). The concept has seen renewed interest in recent years in European and non-European countries, due largely to the work of Nolte and McKee (2008) and Tobias and Yeh (2009).

### Causes of mortality amenable to health care

8. The selected list of causes of mortality amenable to health care is based on the available evidence on the clinical effectiveness of existing medical interventions in treating different conditions. At a given point of time, one should expect the list of selected causes to be unique. However, Nolte and McKee (2004) have shown that virtually each study on amenable mortality had its own list of "causes of deaths amenable to health care". This can be partly explained by differences in the range and level of evidence selected by authors of each study. However, the main divergences may be due to fact that lists have been

drawn at different dates: as science and technology develop, treatments become available to prevent premature deaths for a growing number of diseases. Therefore, the lists of causes of deaths amenable to health care need to be regularly updated to keep in line with current medical practice. A corollary is that any list is time-bound, and only valid for a limited period.

9. The two most recent lists of causes of deaths amenable to health care have been published by Nolte and McKee (2008) and Tobias and Yeh (2009). The two lists have been established in several steps between 2004 and 2009 and have fed each other in the iterative process (see Nolte and McKee, 2004 and 2008; Tobias and Yeh, 2009; and Page *et al.*, 2006 for a full discussion of inclusion and exclusion criteria).

**A comparison of two recent lists**

10. This paper presents and compares two sets of estimates for amenable mortality for OECD countries, based on the lists developed by Nolte and McKee (2008) and Tobias and Yeh (2009). In the absence of international consensus on a unique list of causes for amenable mortality, this paper assesses the sensitivity of the indicator to the list of selected causes.

11. As expected, the two lists of selected causes have more commonalities than differences. Table 1 presents both lists and highlights the differences between them – in italics. The general age limit for "premature" deaths was set in both lists at 75 years, which is about the average life expectancy in developed countries. Above this age, the 'avoidability' of deaths is less obvious and the accuracy of death certification may become problematic (Newey *et al.*, 2004). For several specific causes of death, a different (lower) age range was used, which was not always consistent across the two lists.

12. The main differences between the two lists are the following.

- The list of infectious diseases is not the same. While Nolte and McKee focus on diseases in children under 14, Tobias and Yeh include a selection of invasive bacterial infections. They argue that "early detection and effective intensive support coupled with appropriate antibiotic therapy can massively reduce case fatality rates, e.g. for meningococcal disease, case fatality rate should not exceed 5%" (Page *et al*. 2006).

- Premature mortality from cervical cancer is considered by the two lists as amenable to health care at any age before 75. By contrast, premature mortality from uterine cancer is considered as amenable at any age before 75 by Tobias and Yeh but only before 45 by Nolte and McKee. In fact, Nolte and McKee justify their choice by the fact that most deaths before 45 classified as uterine cancer (ICD-9 codes 179 and 182) arise from cancer of cervix uteri (Nolte and McKee, 2004).

- Bladder cancer and thyroid cancers are considered amenable to care for Tobias and Yeh while they are not in Nolte and McKee. Page *et al*. 2006 argued that if detected at an early stage, treatment or surgical resection are (moderately) effective.

- Nolte and McKee considered that premature deaths caused by diabetes mellitus was amenable to health care only before the age of 50 while Tobias and Yeh keep the general age limit but consider that only half of mortality due to diabetes before age 75 can be avoided by appropriate health care services. Nolte and McKee (2004) argue that lower age limits were set for diabetes mellitus "because the preventability of deaths at older ages from diabetes, and in particular the effectiveness of good diabetic control in reducing vascular complications, remains controversial". By contrast, Page *et al*. (2006) consider that "fatal burden is currently about equally split between incidence reduction and treatment of established disease". Therefore, they split the following three

diseases (ischaemic heart disease, cerebrovascular diseases, and diabetes) randomly on a 50:50 basis between the 'amenable' and 'preventable' categories.

- Nolte and McKee consider that all premature mortality due to cerebrovascular diseases is amenable to health care, while Tobias and Yeh consider that only half of it is amenable to health care, as it is explained above.

- Nolte and McKee consider that all deaths from respiratory diseases between 1 and 14 years are preventable by appropriate and timely treatments. A limit of "under 15" was set as deaths other than in childhood from these causes are likely to reflect some other diseases process (Nolte and McKee, 2004). Tobias and Yeh consider deaths from chronic obstructive pulmonary diseases (COPD) only after 45 and deaths from asthma only before 45 as amenable to health services. They set these age limits to avoid overestimation of fatal cases due to asthma, which may arise from the difficulty in distinguishing these diagnoses as causes of death among middle aged and older adults (Page *et al*, 2006).

- Nolte and McKee consider premature deaths due to misadventures during surgical and medical care since the concept of iatrogenesis is recognised as a matter of concern. Although Tobias and Jackson in a study on New Zealand did include this cause, Tobias and Yeh did not include it in their 2009 list.

**Table 1. Causes of deaths and age group cut-off points selected in the amenable mortality list of Nolte and McKee (2008) and Tobias and Yeh (2009)**

| Disease categories | Nolte and McKee (2008) | Tobias and Yeh (2009) |
|---|---|---|
| **Infectious diseases** | Tuberculosis<br>Septicaemia<br>Pneumonia<br>*Influenza*<br>*Intestinal Infections (other than typhoid, diphtheria) <14*<br>*Diphtheria, tetanus, poliomyelitis*<br>*Whooping cough <14*<br>*Measles 1-14* | Tuberculosis<br>Septicaemia<br>Pneumonia<br>*Selective invasive bacterial infections (Scarlet fever, Meningococcal infection, Erysipelas, Legionnaires' disease, Malaria, Meningitis, Streptococcal pharyngitis, Cellulitis)* |
| **Neoplasms (Cancers)** | Colorectal cancer<br>Malignant neoplasm of skin<br><br>Breast cancer<br>Cervical cancer and *uterine cancer <45*<br>*Neoplasm of the testis*<br><br>Hodgkin's disease,<br>Leukaemia < 45 | Colorectal cancer<br>Melanoma of skin, *nonmelanotic skin cancer*,<br>Breast cancer<br>Cervical cancer and uterine cancer<br>*Bladder cancer*<br>*Thyroid cancer*<br><br>Hodgkin's disease,<br>Leukaemia < 45<br>*Benign tumours* |
| **Endocrine, nutritional and metabolic diseases** | Thyroid disorders<br>Diabetes mellitus *< 50* | Thyroid disorders<br>Diabetes (type 2) *- 50% of deaths* |
| **Diseases of the nervous system** | Epilepsy | Epilepsy |
| **Diseases of the circulatory system** | Rheumatic heart diseases<br>Ischemic heart diseases – 50% of deaths<br>Cerebrovascular diseases<br>Hypertensive diseases | Rheumatic heart diseases<br>Ischemic heart diseases - 50% of deaths<br>Cerebrovascular diseases *– 50% of deaths*<br>Hypertensive diseases |
| **Diseases of the genito-urinary system** | Nephritis and nephrosis<br>Benign prostatic hyperplasia | Nephritis and nephrosis<br>Obstructive uropathy and prostatic hyperplasia |
| **Diseases of the respiratory system** | *All respiratory diseases (excl. pneumonia/influenza) 1-14* | Chronic Obstructive Pulmonary disease *>45*<br>Asthma *< 45* |
| **Diseases of the digestive system** | Peptic ulcer<br>Appendicitis<br>Abdominal hernia<br>Cholelithiasis and cholecystitis | Peptic ulcer disease<br>*Acute abdomen*, appendicitis, *intestinal obstruction*<br>Cholecystitis / lithiasis, pancreatitis, hernia |
| **Perinatal mortality** | Maternal deaths<br>Perinatal deaths (excluding stillbirths)<br>*Congenital cardiovascular anomalies* | *Birth defects,* Complications of the perinatal period |
| **External causes** | Misadventures to patients during surgical and medical care | |

Note: (1) Age limit is 75 years except if otherwise mentioned. "<45" means "before the age of 45", "1-14" from 1 to 14 years, etc. 2) The italics highlight the differences between the two lists.
Sources: Nolte and McKee (2008); Tobias and Yeh (2009).

## 3. COMPARING THE RESULTS FROM THE TWO LISTS OF AMENABLE MORTALITY FOR OECD COUNTRIES

13. This section compares estimates of amenable mortality rates from two lists. Results are presented by gender, by cause, and by transmittable/non-transmittable disease, and changes over the last decade are estimated.

### Data

14. Amenable mortality rates were computed from data on deaths by cause and age group from the World Health Organization (WHO). The WHO database provided data for 31 OECD countries for the period 1997-2007[2].

15. The WHO mortality database reports the number of deaths by cause using the International Classification of Diseases (ICD) (WHO, 2009). For the period 1997-2007, causes of deaths in OECD countries were coded either in ICD-9 or in ICD-10.

16. A 2005 study assessed the quality of the deaths registration data included in the WHO Statistical Information System (WHOSIS). Most of the 31 OECD countries that are included in this analysis had data of medium or high quality. Only three countries (Greece, Poland and Portugal) had low quality data, in that it was less than 70% complete, or more than 20% of registrations had ill-defined codes (Mathers *et al.*, 2005).

17. Mortality rates for all countries were age-standardised according to the 2005 OECD population age structure[3], to remove any effect from variations in the age structure across countries or over time. Population data by age groups were extracted from the WHOSIS web site. For Mexico, population information was extracted from the official reports of the National Institute for Statistics and Geographies (INEGI, 2009).

18. Some minor modifications were made to the initial list in ICD-9 established by Tobias and Yeh to match with grouping of codes used by WHO: for instance, deaths from thyroid cancer were excluded because they are integrated in a much larger category in the WHO database, and deaths from asthma were included into the COPD category. This latter implies that age limits set by Tobias and Yeh for asthma and COPD were not always respected: all deaths after 45 were taken into account for both causes. A list of all the modifications is provided in Annex 2. However, these modifications only had minor implications since for most countries they only refer to the earliest years during which causes of death were coded using ICD-9. The ICD-10 codes listed by Tobias and Yeh fitted the WHO codes without further modification. No modification was needed in the Nolte and McKee's list.

2. Three OECD countries were not included in the analysis because available data did not match the requirements for this study: no data was available for Turkey; data for Belgium was only available up to 1999 and codes used for Switzerland could not be mapped to the Tobias and Yeh's list of amenable mortality.

3. Using the 2005 OECD population structure rather than the 1980 population structure -as is done in OECD Health Data- has an influence on the level of the standardised mortality rates. However this has almost no impact on the countries ranking.

**Results and comparison of two lists of selected causes**

19. In 2007, age-standardised amenable mortality rates ranged from 60 to 200 deaths per 100 000 population in OECD countries (see Figure 2). The two lists provided similar results for most countries. Eastern European countries (Estonia, Hungary, the Slovak Republic, Poland and the Czech Republic), along with Mexico, had comparatively high rates, followed by Portugal, the United States and Chile– with rates above 100 per 100 000 population. Japan, France, Italy, Sweden and Iceland had the lowest rates, ranging from 60 to 70.

20. Results obtained for the two lists are quite similar though significant differences exist for seven countries. For most countries, amenable mortality rates are lower under Nolte and McKee's list than for Tobias and Yeh's, the exceptions being Estonia, the Slovak Republic, Korea and Japan. On average, amenable mortality rates calculated by Tobias and Yeh's list were 9% higher. However, they were 30% higher for Mexico, 25% for New Zealand, and more than 20% for Australia, Denmark, the Netherlands, Norway, and the United States. Country ranking slightly differs according to the list used: France is the top performer using the Nolte and McKee's list while it is just behind Japan using the Tobias and Yeh's list.

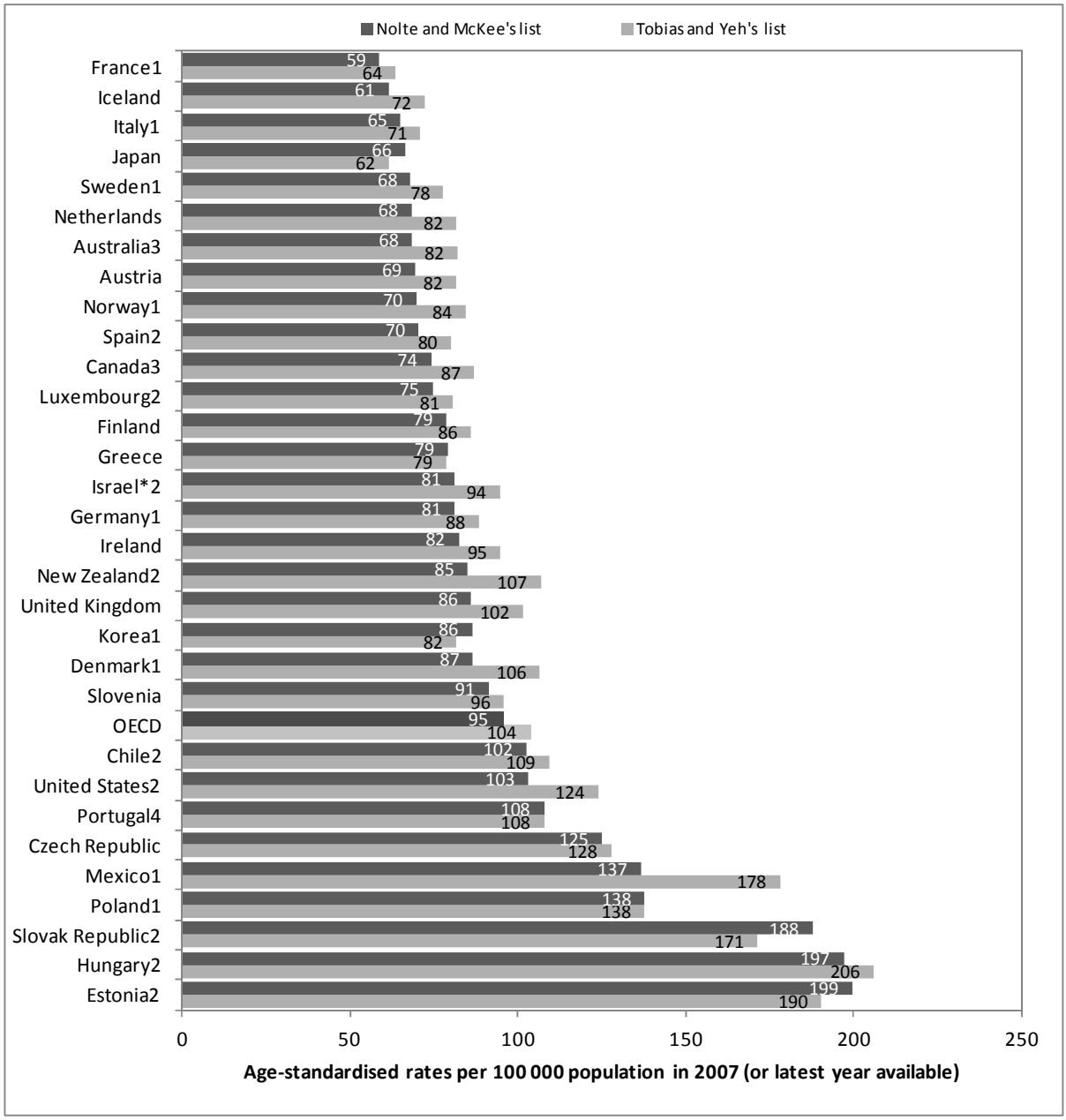
21. Observed differences are due of course to differences in selected causes and age limits. They are further explored later in this document.

22. Regardless of the list chosen, amenable mortality rates for males are in general higher than for females. Under Nolte and McKee's list, in 2007, male mortality rates ranged from 62 deaths per 100 000 in France to 276 deaths in Estonia[4], while female mortality rates ranged from 53 in Japan to 155 deaths per 100 000 in Hungary (see Figure 3). Results obtained from the two lists are broadly comparable but between-list differences are larger in magnitude for males.

23. Differences between males and females are much higher in countries with high amenable mortality rates than in countries with low amenable mortality rates, indicating that the well-known gap between male and female premature mortality is partly amenable to health care.

4. 2006 data for France and 2005 data for Estonia

**Figure 2. Amenable mortality in 31 OECD countries, 2007 or last year available**

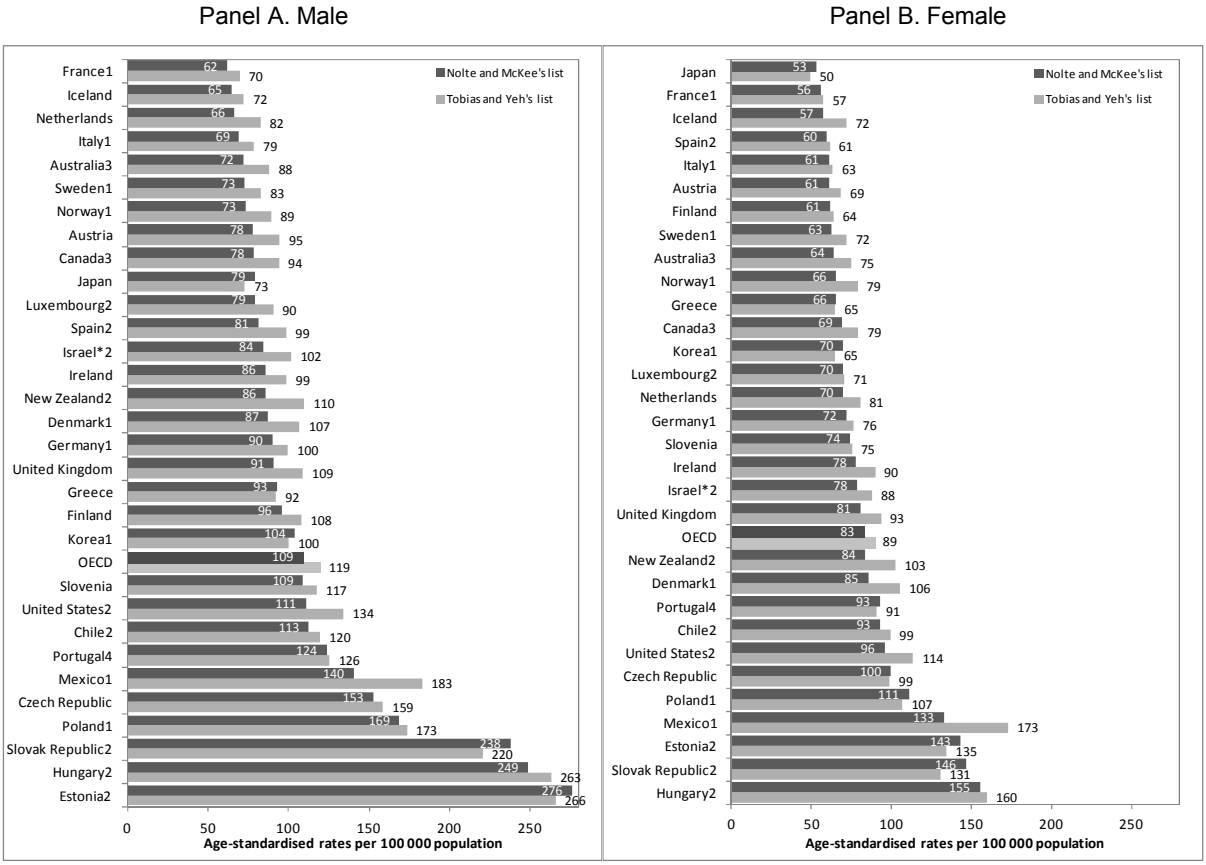



Note: (1) 2006 data for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368821

**Figure 3. Amenable mortality by gender, 2007 or latest available year**




Note: (1) 2006 for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368840

## Diseases of the circulatory system and cancer are the leading causes of amenable mortality

24. Diseases of the circulatory system and cancer are the leading causes of amenable mortality in OECD countries, but their respective contributions to overall amenable mortality varies with the list of selected causes.

25. In 2007, diseases of the circulatory system were the leading cause of amenable mortality in the two lists. They accounted for 51% of overall amenable mortality according to the Nolte and McKee's list, but only to 34% according to Tobias and Yeh's list. This difference is mainly due to the fact that the former considers all premature deaths from cerebrovascular diseases as amenable to health care while the later considers only half of these premature deaths as amenable (see Annex 3).

26. Cancer explains almost one-third of overall amenable mortality in the two lists (29% according to Nolte and McKee's list and 31% according to Tobias and Yeh's list). Endocrine, nutritional and metabolic diseases make a larger contribution to overall amenable mortality in Tobias and Yeh's list (4.9% versus 1.1% in Nolte and McKee's list) mainly because the Tobias and Yeh's list does not include a lower age

threshold for deaths attributed to diabetes. Diseases of the respiratory systems also contribute more to overall mortality in Tobias and Yeh's list (8.9% versus 0.1%) due to the inclusion of premature deaths caused by asthma and COPD[5].

*Countries have different profiles, slightly influenced by the list used*

27. These average results across OECD countries hide very different country profiles. For instance, mortality amenable to cancer varies from 14% of overall mortality in Mexico to 41% in France, when estimated using Nolte and McKee's list (results obtained with Tobias and Yeh's list are largely comparable). Similarly, deaths from infectious diseases -as selected by Nolte and McKee- account for 16% of the overall amenable mortality in Japan, and around 11-12% in Luxembourg, Mexico and the United States; but only 2% in Iceland and New Zealand (see Annex 3). These results are broadly consistent with those obtained with Tobias and Yeh's list.

28. For some disease categories and some countries, however, the two lists lead to very contrasting results. For instance, endocrine, nutritional and metabolic diseases represent a high share of amenable deaths in Mexico when estimated with Tobias and Yeh's list (26%) but only 6% when using Nolte and McKee's list. While amenable deaths due to this category is always higher when estimated with Tobias and Yeh (because of the absence of a lower age threshold for deaths due to diabetes), the difference between the two estimates is particularly high for Mexico, suggesting that a high number of deaths from diabetes occur at older ages in Mexico.

*Relative positions of countries for amenable deaths by cause are similar across lists, except for two categories*

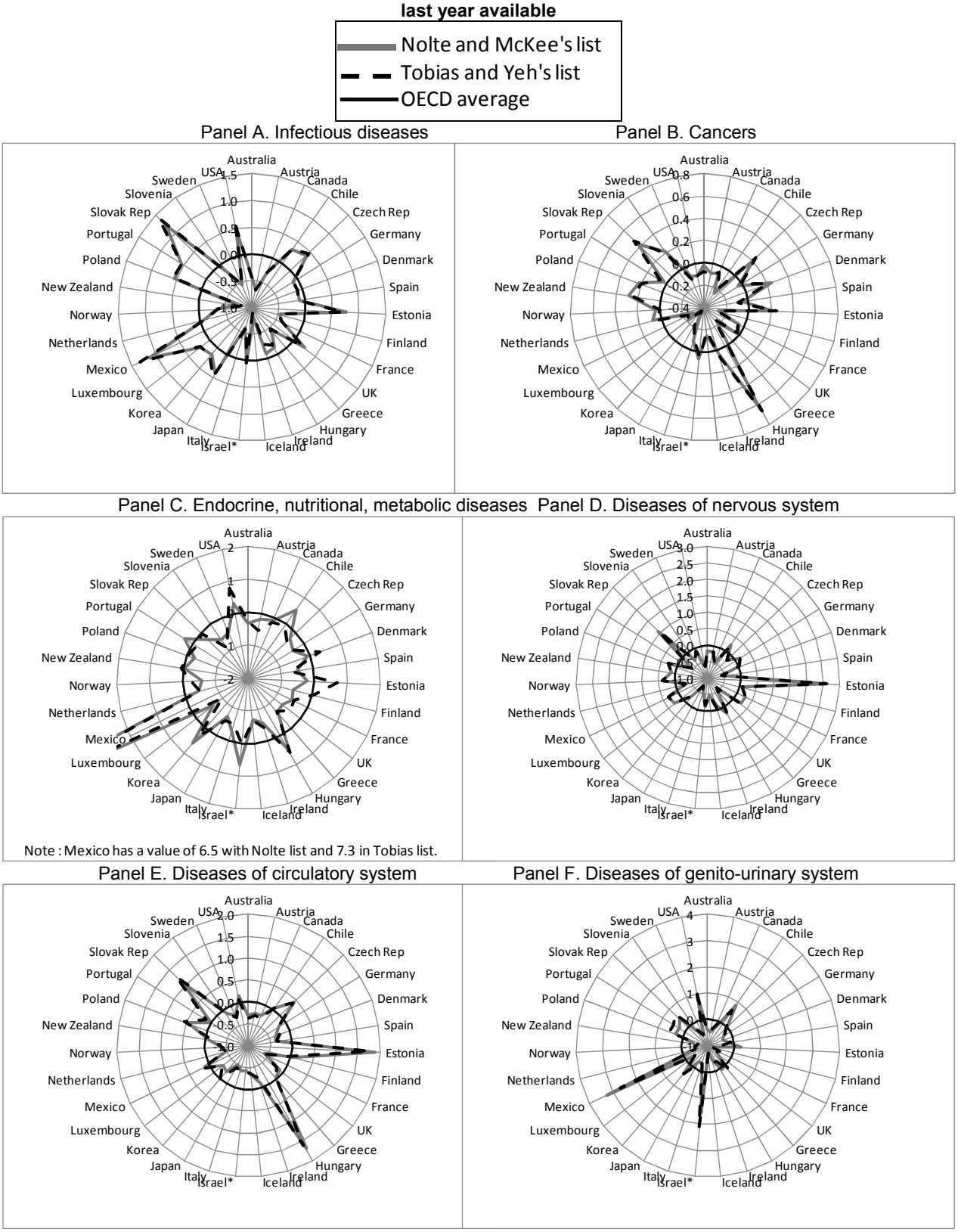
29. Figure 4 shows relative positions of countries by comparison to the OECD average for each of the disease categories for the two lists. Relative positions of countries are very similar with two exceptions: deaths from endocrine, nutritional and metabolic diseases and diseases of respiratory system.

30. Not surprisingly, countries with high overall amenable mortality often have high rates for individual causes. However, this is not systematic. For instance, Mexico has a relatively low level of amenable mortality for cancer; Hungary has a relatively low rate of amenable mortality for infectious diseases; and the United States is below the average for amenable mortality due to cancer and diseases of the nervous system. Countries with good overall results usually have mortality rates by disease category below the OECD average, with some exceptions (for instance, infectious diseases in Japan).

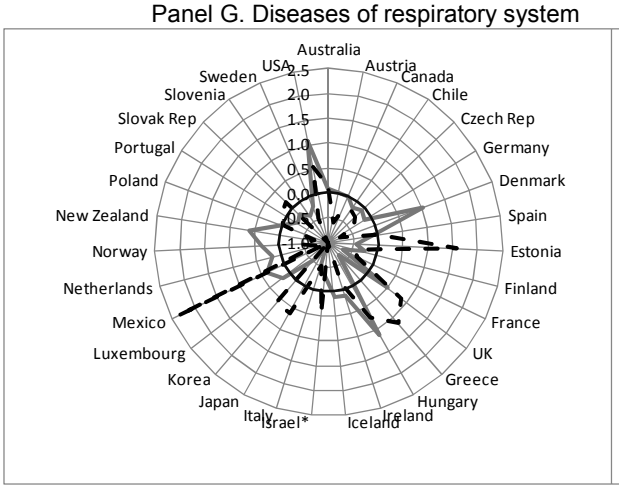
31. Though such analyses are useful to identify weaknesses and assets of health systems, it should be kept in mind that some of these variations may be partly explained by differences in coding practices.

5. Note that we were not able to follow strictly Tobias and Yeh's lists age limits for Asthma and COPD. Amenable mortality due to asthma is probably overestimated in this study.

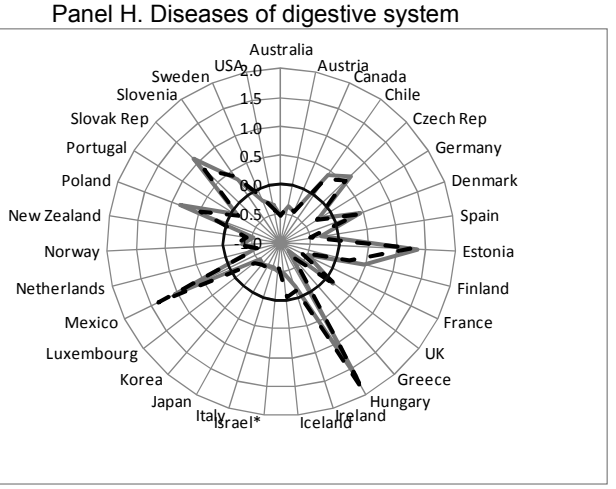
**Figure 4. Relative positions of countries in relation to the OECD average for 10 disease categories, 2007 or last year available**



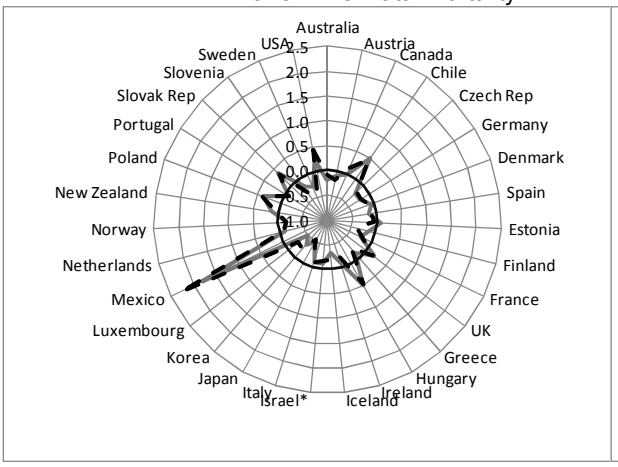
Panel G. Diseases of respiratory system



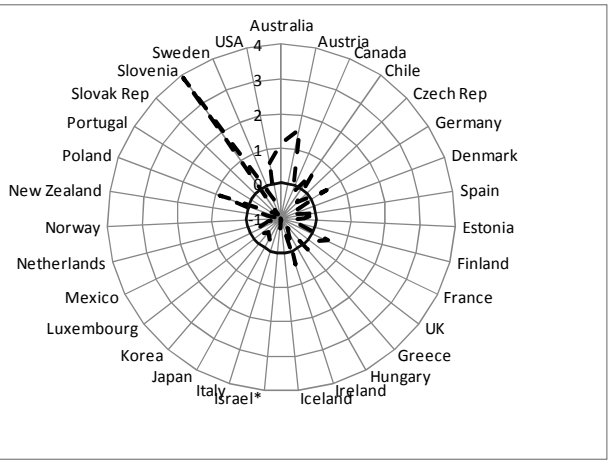

Panel H. Diseases of digestive system



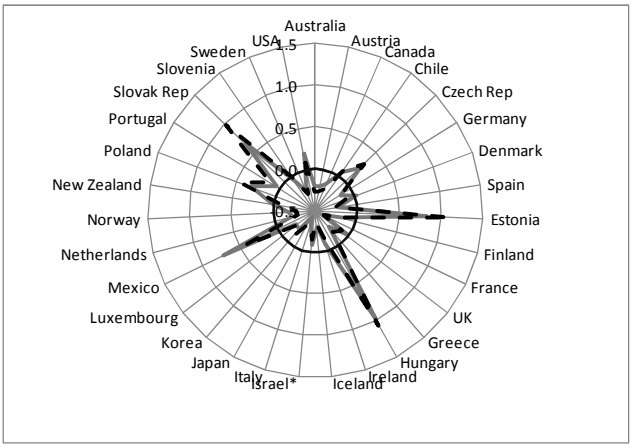

Panel I. Perinatal mortality




Panel J. External causes




Panel K. All causes




Note: (1) 2006 data for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.
Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368859

**Amenable mortality has declined in all OECD countries over the last decade**

32. Regardless of the list chosen, amenable mortality has declined in all OECD countries over the 1997-2007 period though at different rates depending on the country and on the list chosen. The average annual decline is 3.7% with Nolte and McKee's list and 3.1% with Tobias and Yeh's list (see Figure 5).

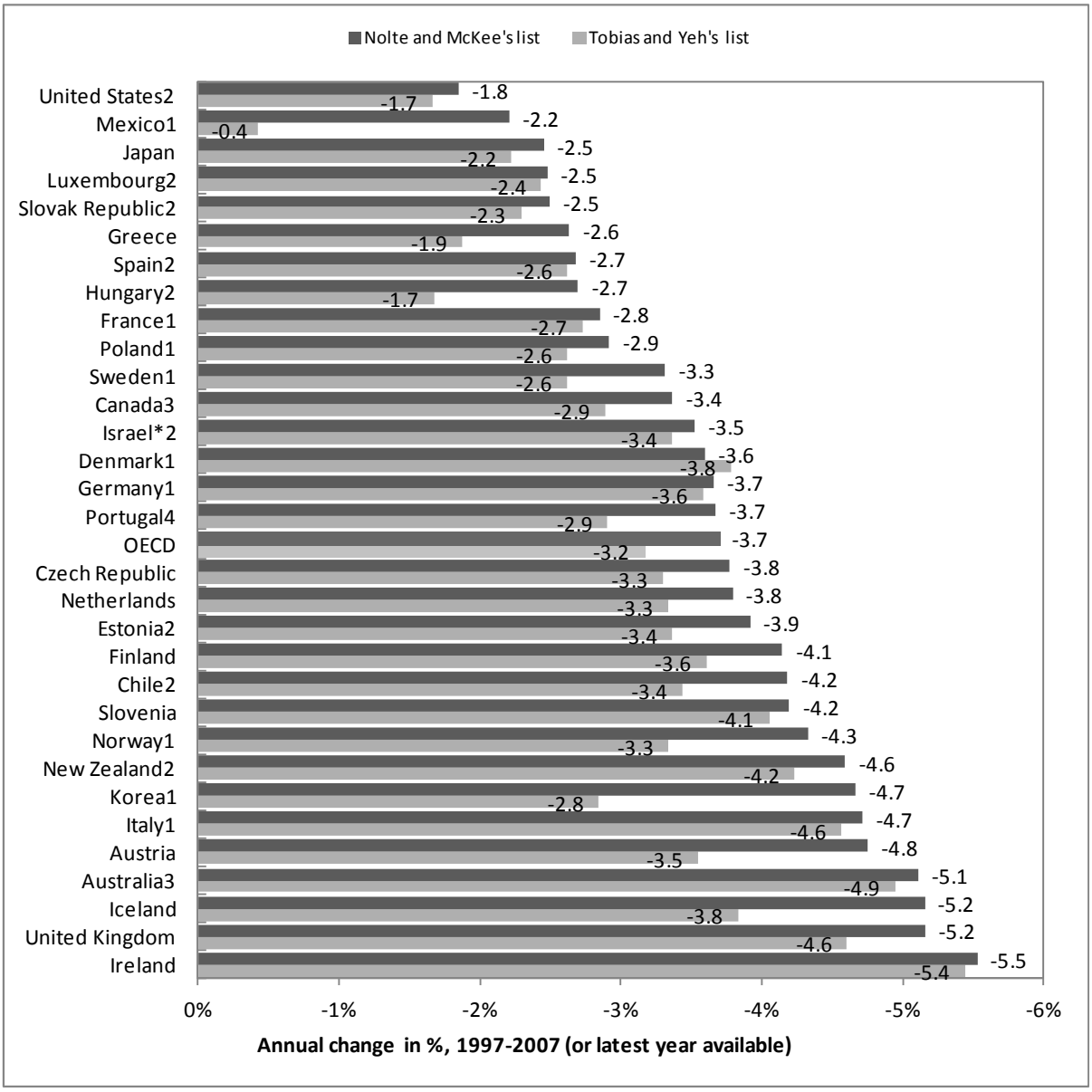
33. Based on the Nolte and McKee's list, annual changes from 1997 to 2007 ranged from -1.8% in the United States to -5.5% in Ireland. Countries with relatively low decline (below 3%) can be clustered in two groups: in the United States, Mexico, the Slovak Republic, Hungary and Poland, amenable mortality was (and still is) relatively high, suggesting that more progress could be achieved. In Japan, Luxembourg, Greece, Spain and France, by contrast, amenable mortality was already comparatively low in 1997.

34. Countries with the highest declines also have different patterns: Ireland and the United Kingdom had above-average amenable mortality in 1997 and are now just below the OECD average, while Australia and Iceland already had comparatively low amenable mortality in 1997 and nevertheless achieved progress.

35. Annual changes estimated from Tobias's list range from -0.4% for Mexico to -5.4% for Ireland. Differences with annual changes estimated with Nolte and McKee's list are particularly striking with more than a 1-percentage-point difference for Austria, Hungary, Iceland, Korea, Mexico, and Norway.

36. Analysis by gender shows that for both lists, the average annual decline in amenable mortality was the highest in Ireland, Iceland, the United Kingdom and Australia for males and in Ireland, Korea (based on the Nolte and McKee's list), Estonia, the United Kingdom and Australia for females. The decline was low for both genders in the United States.

**Figure 5. Annual change in amenable mortality, 1997 to 2007 (or last year available)**




Note: (1) 2006 for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368878

*A few OECD countries have achieved a significant decline in amenable mortality linked to transmittable diseases or the perinatal period*

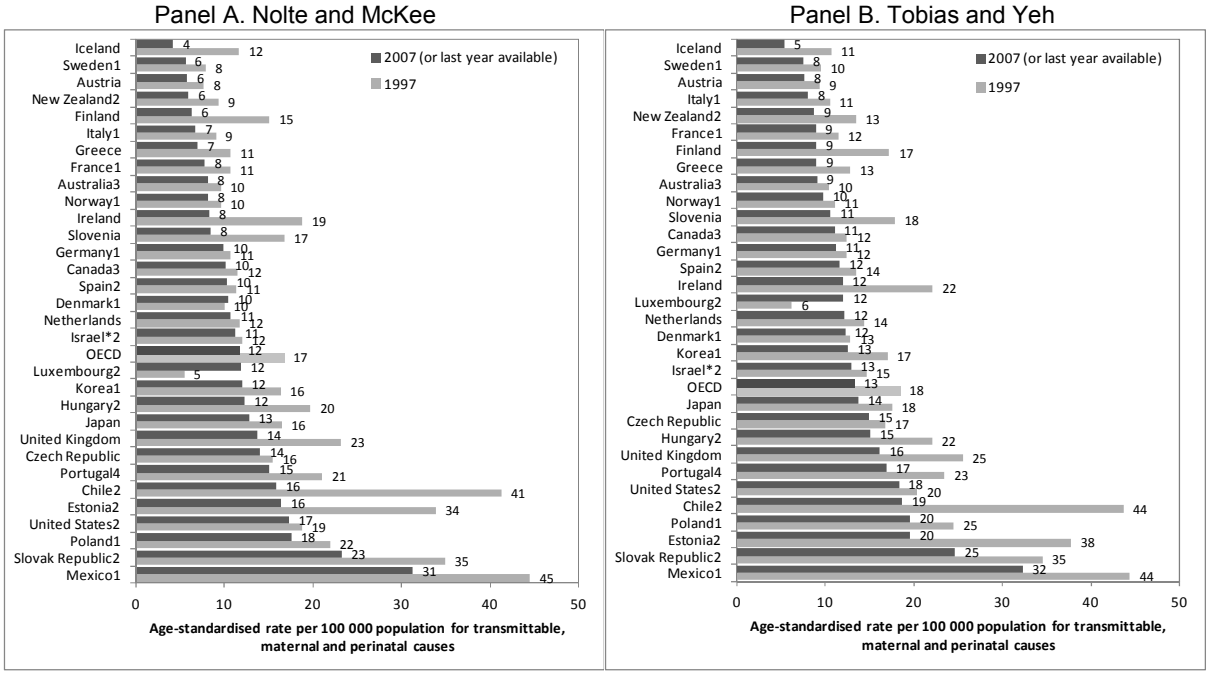
37. For some countries, a split of amenable deaths in two categories ("transmittable diseases, maternal and perinatal deaths" on one side and "non-transmittable diseases" on the other side) is particularly relevant to analyse changes in amenable mortality. Since effective and low-cost interventions exist to treat acute infections in many cases and deaths in the perinatal period can be prevented by appropriate health policies, countries can achieve relatively good performance in these areas with minimum investments. On average, deaths linked to transmittable diseases or the perinatal period contribute 12-13% to the overall level of amenable mortality based on the two lists.

38. Amenable mortality due to transmittable diseases or occurring in the perinatal period ranged from 4 deaths per 100 000 population in Iceland to 31 in Mexico with Nolte and McKee's list and from 5 and 32 deaths per 100 000 for the same countries with Tobias and Yeh's list. Countries profiles are very similar across lists thought their ranking varies slightly (Figure 5).

39. Mexico, Estonia, and Chile, which had the highest mortality rates for transmittable diseases and perinatal mortality in 1997, have accomplished significant progress: the mortality rate was reduced by 30% in Mexico, by around 50% in Estonia, and by around 60% in Chile between 1997 and 2007. Finland, Iceland and Ireland, though starting from a much lower level, also decreased mortality rates by more than 45% under Tobias and Yeh's list and up to 50-60% under Nolte and McKee's list (see Figure 6).

40. By contrast, Poland and the United States achieved little progress, despite their relatively weak position in 1997.

**Figure 6. Amenable mortality for transmittable diseases, maternal and perinatal causes, 1997 to 2007**




Note: (1) 2006 for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.
Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368897

*Most OECD countries have made remarkable progress in reducing mortality due to non-transmittable diseases*

41. Non-transmittable diseases account for a much larger proportion of overall amenable mortality (87 to 88% based on the two lists), and country ranking for this disease category closely mirrors the country ranking for overall mortality. Mortality rates for this category ranged from 51 per 100 000 population in France (2006) to 185 in Hungary (2005) under Nolte and McKee's list and from 48 in Japan (2007) to 191 in Hungary (2005) under Tobias and Yeh's list. Eastern European countries and Mexico have among the highest rates of mortality, while France, Japan, Italy, and Iceland achieved better outcomes.

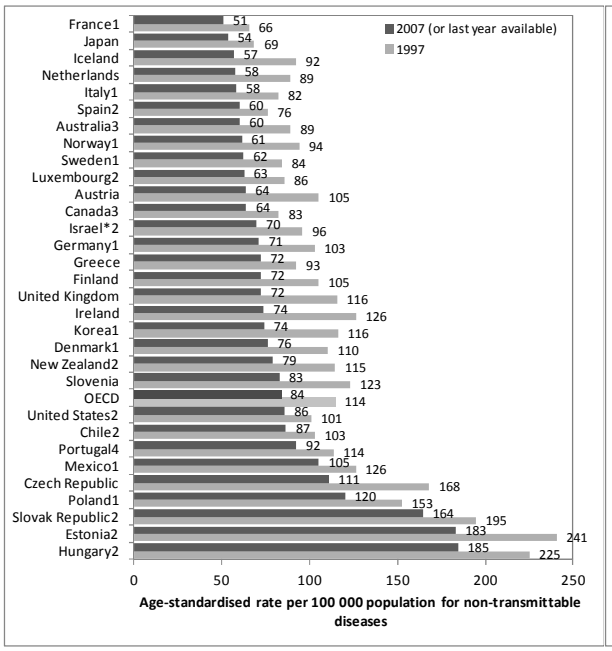
42. All countries had a reduction in amenable mortality for non-transmittable diseases: the average decline over the 10-year period was 27%[6] under Nolte and McKee's list and 23% under Tobias and Yeh's list. The decline was particularly high in Ireland (-42% in both lists), and exceeded 30% in several other countries: Australia, Austria, the Czech Republic, Germany, Denmark, Finland, Korea, Norway, the Netherlands, New Zealand, Slovenia and the United Kingdom, when using Nolte and McKee's list. These estimates are consistent with those obtained from Tobias and Yeh's list except for Korea, where the reduction was "only" 22% using Tobias and Yeh's list.

43. By contrast, Chile, the Slovak Republic, and the United States, despite having relatively high levels of amenable mortality for non-communicable diseases at the beginning of the period, experienced the lowest declines (around 15% according to Nolte and McKee's list and around 10% according to Tobias and Yeh's list). Using the list established by Tobias and Yeh, the trend in Mexico is unfavourable: the mortality rate has increased by 3% over the period. This result is mainly due to an increase in the number of diseases of endocrine, nutritional and metabolic system (mainly diabetes).

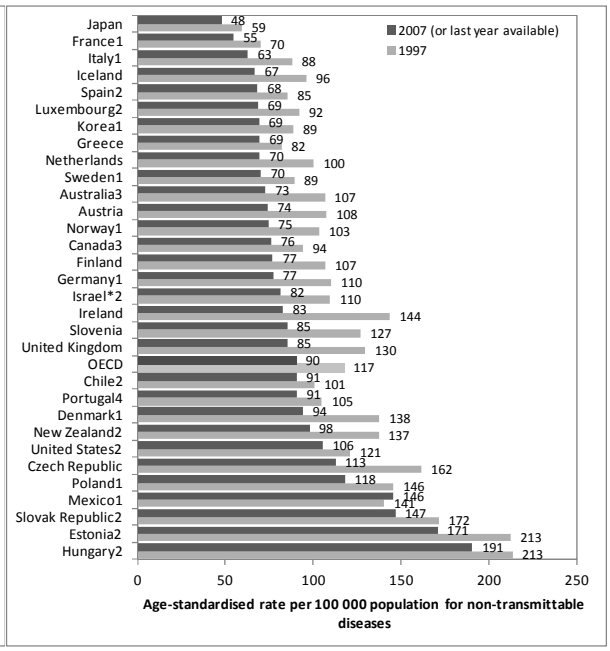
6. For some countries, data are not available for the whole period. In such cases, the overall reduction in amenable mortality is likely to be underestimated, as well as the OECD average.

**Figure 7. Amenable mortality for non-transmittable diseases, 1997 to 2007**

Panel A. Nolte and McKee




Panel B. Tobias and Yeh




Note: (1) 2006 for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368916

## 4. THE POTENTIAL AND LIMITATIONS OF AMENABLE MORTALITY AS AN OUTCOME INDICATOR FOR HEALTH SYSTEM PERFORMANCE

44. The third objective of this paper is to assess the potential and limitations of amenable mortality as an indicator to measure the outcomes of health systems. We aim to answer two questions: Does amenable mortality really improve on the information given by general mortality indicators? What are the limitations of this indicator when assessing health systems performance?

**Amenable mortality and other indicators of health status: does it really make a difference?**

45. The concept of amenable mortality responds to a fundamental criticism of studies exploring the relationships between resources devoted to health systems and general indicators of health status (proxied by general mortality), which is that health systems cannot be held responsible for all premature deaths (e.g. road accidents, crime).

46. As expected, the correlation between amenable mortality rates and life expectancy is high (>0.9), since amenable mortality is, by construction, included in overall mortality (see Figure 8). However, amenable mortality rates can differ in countries with similar life expectancy at birth. For instance, life expectancy in New Zealand and in the Netherlands is the same while amenable mortality is 25% higher in the former than in the later using Nolte and McKee's list (or 30% higher using Tobias and Yeh's list).

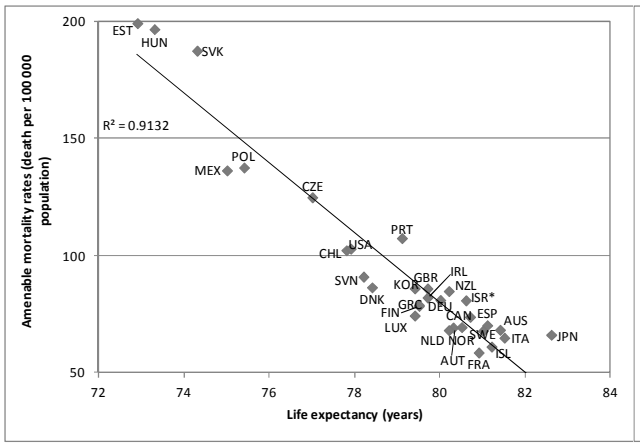
47. Similarly, substantial differences exist for some countries between amenable mortality and Potential Years of Life Lost (see Figure 8). The PYLL indicator sums all years of life lost between the age of death and an arbitrary age threshold, which continues to be set at 70 years old in OECD Health Data. In contrast with amenable mortality, which gives the same weight to every death before 75, PYLL gives a higher weight to a death at young ages: by construction, a death at the age of 30 will have a weight twice that of a death at 50. In addition, PYLL incorporates all causes of mortality, including external causes such as road accidents and suicide.

48. Relative positions of countries show that the two indicators would not lead to the same country ranking. For instance, Poland and Mexico have similar rates for mortality amenable to health care –using Nolte and McKee's list- but very different positions for PYLLs. This suggests that people are dying at younger ages in Mexico (from causes amenable to health care or not), or that people in Mexico are more likely to die from causes not amenable to health care, or a mix of both. By contrast, Poland and the Slovak Republic have similar PYLLs but very different rates for mortality amenable to health care according to either Nolte and McKee's list or Tobias and Yeh's list. Several hypotheses can be put forward as an explanation and would need further investigations to be confirmed.

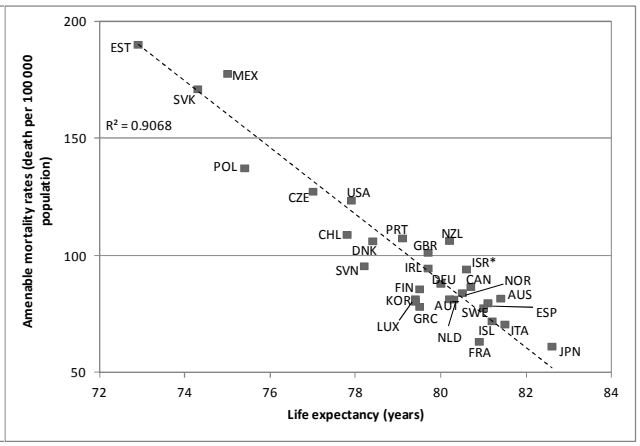
49. The general conclusion is that the concept of amenable mortality, in addition to its attractive conceptual design, provides new information that is not directly reflected in general mortality indicators traditionally used to measure the outcomes of health systems.

**Figure 8. Life expectancy and amenable mortality in OECD countries, 2007 or latest available year**

Panel A. Nolte and McKee




Panel B. Tobias and Yeh

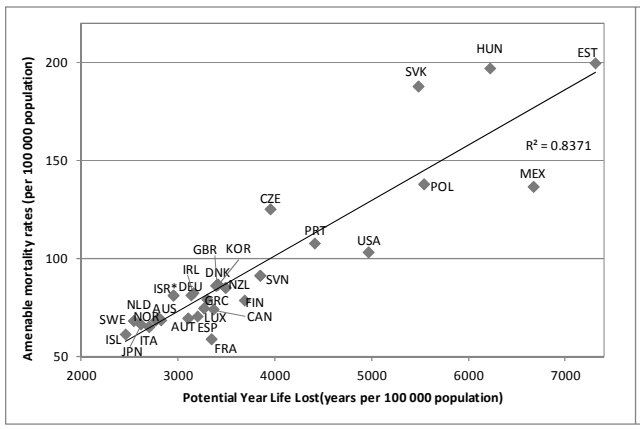



Source: WHO Mortality Database 2010 and OECD Health Data 2010.

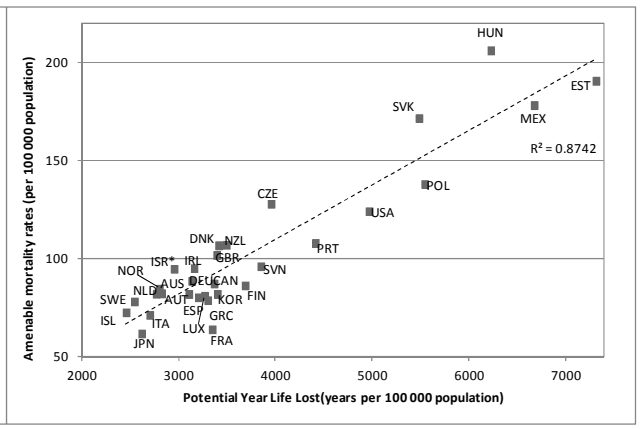
*StatLink* http://dx.doi.org/10.1787/888932368935

**Figure 9. Potential Years of Life Lost and amenable mortality in OECD countries, 2007 or latest available year**

Panel A. Nolte and McKee




Panel B. Tobias and Yeh




Source: WHO Mortality Database 2010 and OECD Health Data 2010.

*StatLink* http://dx.doi.org/10.1787/888932368954

## Limitations

50. While amenable mortality may be a relevant indicator to assess improvements in the performance of health care systems, it has several limitations: some of them pertain to the quality and comparability of data; others are more linked to the concept itself. These limitations are discussed below.

*Data on causes of mortality are not perfect*

51. Different diagnostic practices in completing death certificates and in using ICD codes across countries and across time reduce cross-country comparability (Mathers *et al.*, 2005). This problem is not unique to amenable mortality studies, and applies to any study using mortality data to make comparisons over time or across countries. However, the quality and comparability of mortality data has been assessed to be sufficient to be used in epidemiological studies, at least in European countries (Jougla *et al.*, 2001).

*The selection of causes of death "amenable to health care" varies over time*

52. The selection of causes of deaths "amenable to health care" is time-dependent: technological progress constantly increases the opportunities to prevent premature deaths by secondary prevention and treatments. Lists of amenable causes, which are based on experts' judgments about the effectiveness of health care interventions, have to be regularly updated. This means that studies on amenable mortality are more appropriately used to make comparisons between countries at a moment in time rather than over extended periods.

53. Depending on the cause of death, any modification to a list of amenable mortality will have a significant impact on the study findings (Nolte and McKee, 2008). An alternative that has proved to be effective in giving robustness and reliability to lists is the involvement of different interest groups and experts to define by consensus the causes of death to be included. Such a consensus process should be ongoing, to take into accounts innovations in health care.

54. The current EU-funded project "AMIEHS" aims to develop a validated set of avoidable mortality-based indicators that can be used in the future surveillance of the performance of health systems in Europe. The project commenced in 2007, and brought together partners in seven EU countries, with an advisory board of leading international experts (for more details, see Box 1). This project is expected to deliver an alternative list of causes amenable to health care during the course of 2011.

**Box 1. The AMIEHS project**

A current EU-funded project, 'Avoidable Mortality in the European Union: towards better Indicators for the Effectiveness of Health Systems' (abbreviated AMIEHS), led by Erasmus Medical University and coordinated jointly with the London School of Hygiene and Tropical Medicine, aims to develop a validated set of avoidable mortality-based indicators that can be used in the future surveillance of the performance of health systems in Europe. The project commenced in 2007, and brought together partners in seven EU countries, with an advisory board of leading international experts.

The AMIEHS project has seven work packages. WP 1 seeks to develop a preliminary list of causes of death for which the literature indicates a reasonable level of evidence for 'avoidability'. It does this through preselecting causes of death on the basis of UK mortality data, defining the desired properties of AM indicators, and conducting a review of the literature. WP 2 analyses the introduction of health care innovations that may have reduced AM in participating countries. The combined outcome of WP 1 and WP 2, around a dozen causes of death, forms the basis of a revised list of AM.

WP 3 and 4 focus on building a harmonised data base on trends in avoidable mortality since 1970 in eight European countries, evaluating the effect of ICD coding changes, and developing correction factors to adjust observed mortality trends. WP 5 determines whether the introduction of health care innovations coincided with declines in mortality from selected avoidable causes. WP 6 uses the DELPHI method to develop and agree on a set on validated AM-based indicators, through expert consensus. Lastly, WP 7 will illustrate the use of AM indicators by preparing an e-atlas of variations in AM in some 25 countries.

Source: http://amiehs.lshtm.ac.uk/

55. The appropriate age limit is also likely to vary over time. The remarkable increase in life expectancy in the general population in the last 50 years has changed the conception of what is considered

to be "premature death". Yet, the age limit may be constrained by the quality of data: the validity of death certification deteriorates as the age of death increases, due to the presence of multiple co-morbidities (Nolte and McKee, 2008). However, age limits, which are currently set under 75 for certain diseases, may increase.

*Amenable mortality is not adjusted by the prevalence of diseases*

56. More importantly, the prevalence of diseases whose deaths are amenable to health care varies widely across countries. If the prevalence of heart disease is substantially higher in one country, it will need to devote more resources to avoid deaths from this disease category. For instance, mortality from cerebrovascular diseases may be twice as high in country A than in country B, either because prevalence is double or because A does not succeed in preventing premature death from this condition, or a combination of both. This should be kept in mind when analysing amenable mortality statistics.

57. Similarly, the analysis of amenable mortality over time does not take into account changes in the prevalence of diseases. If the prevalence of a specific disease increases rapidly in a given period, increases in mortality rates may be (wrongly) interpreted as a failure of the health care system even if the system is as effective or more effective in preventing a large proportion of premature deaths from this disease.

*Amenable mortality does not take into account resources available to provide effective treatments in each country*

58. Lists of amenable mortality used in international comparisons are based on available evidence about the existence and the effectiveness of medical interventions to prevent premature deaths. They do not consider whether required professional skills or technologies are available in a specific country for delivering these medical interventions on a wide scale. Yet, huge discrepancies in resources available to health care across OECD countries lead to very different rates of diffusion of new medical practices or new technologies.

59. Consequently, low amenable mortality rates in a given country can reflect the fact that appropriate technologies are not available, that health care quality is low, or a mix of both. Thus, this indicator should not be used without caution to provide a diagnostic on the performance of health care systems: ideally, this indicator should be considered together with the amount of resources available to health care (see OECD, 2010 for an example). On the other hand, amenable mortality can be used to assess progress achieved by a given country over a time-period.

*Amenable mortality does not take into account improvements in the quality of life that do not extend life*

60. By definition, amenable mortality does not take into account improvements in the quality of life. Yet many interventions of health care systems in industrialised countries do not aim to extend life but rather to improve the quality of life (e.g. cataract surgery, hip replacement, rehabilitation services or even palliative care). Assessing the outcomes of heath systems more comprehensively would necessitate a broader set of outcome indicators to take into account improvements in the quality of life and well-being.

*Amenable mortality is not sufficient to assess the performance of the health system beyond health care*

61. The concept of amenable mortality focuses on premature deaths that are preventable by effective health *care* interventions and thus should not be used to assess the performances of the entire health system. Mental illnesses for instance are virtually absent from all lists of causes amenable to health care. Premature mortality by suicide is not considered by experts to be avoidable by health care interventions. Mortality from lung cancer, which could be reduced by interventions limiting smoking prevalence, is not considered at all. Therefore, other indicators are needed to assess the performance of health systems beyond health care services.

## 5. CONCLUSION

62. While improving health is the primary goal of health systems, measuring the extent of health systems contribution to the health of the population remains a challenge. Efforts have been made to develop indicators to be used for the purpose of assessing health systems performance in OECD countries, but no single indicator has emerged as the ultimate outcome indicator.

63. Researchers have developed the concept of mortality amenable to health care, as a possible indicator to measure the effectiveness of health care systems in preventing premature deaths that can be avoided by appropriate health care intervention. This paper assessed the feasibility of using this indicator in OECD countries. It shows that data are readily available for most OECD countries and that the potential of this indicator for cross-country comparisons of health care systems effectiveness is high. It also shows that results are sensitive to the list of causes selected by experts as "amenable to health care".

64. There are several limitations in the use of amenable mortality as an indicator of health care systems performance: it does not take into account improvements in the quality of life, it is time bound, sensitive to differences in the prevalence of diseases across countries; and it is not adjusted by the amount of resources *actually available* in each country to deliver effective care. However, amenable mortality remains a useful concept, which adds information to existing sets of outcome indicators for the analysis of health systems performance. The constitution of a consensual list of causes amenable to health care is therefore desirable and may be delivered in 2011 by the AMIEHS project.

## ANNEX 1: ICD-10 CODES SELECTED FOR AMENABLE MORTALITY

| Condition | Nolte and McKee (2008) | Tobias and Yeh (2009) |
|---|---|---|
| Tuberculosis | A15-A19, B90 | A15-A19, B90 |
| Selected invasive infections | A00-09 (age 0-14), A35-36, A37 (age 0-14), A40-41, A80, B05 (age 1-14), J10-18 | A38-41, A46, A48.1, B50-54, G00, G03, J13-15, J18, L03 |
| Colorectal cancer | C18-21 | C18-21 |
| Malignant neoplasms of skin | C44 | C43-44 |
| Breast cancer (females only) | C50 | C50 |
| Cervical cancer | C53 | C53 |
| Uterine cancer | C54-55 (age 0-44) | C54-55 |
| Testis cancer | C62 | – |
| Bladder cancer | – | C67 |
| Thyroid cancer | – | C73 |
| Hodgkin's disease | C81 | C81 |
| Leukaemia (<45 years) | C91-95 | C91-95 |
| Benign tumours | – | D10-36 |
| Thyroid disorders | E00-07 | E00-07 |
| Diabetes (type 2) | E10-14 (age 0-49) | E10-14 (50%) |
| Epilepsy | G40-41 | G40-41 |
| Rheumatic & other valvular heart disease | I05-09 | I01-09 |
| Hypertensive heart disease | I10-13, I15 | I11 |
| Ischemic heart disease (50%) | I20-25 | I20-25 |
| Cerebrovascular disease | I60-69 | I60-69 (50%) |
| Respiratory diseases (excl. pneumonia, influenza) (age 1-14) | J00-09, J20-99 | – |
| Chronic obstructive pulmonary disease (>45 years) | – | J40-J44 |
| Asthma (<45 years) | – | J45-J46 |
| Peptic ulcer disease | K25-27 | K25-K28 |
| Acute abdomen, appendicitis, intestinal obstruction, cholecystitis/lithiasis, pancreatitis, hernia | K35-38, K40-46, K80-81 | K35-38, K40-46, K80-83, K85-86, K91.5 |
| Nephritis & nephrosis | N00-07, N17-19, N25-27 | I12-I13, N00-N09, N17-N19 |
| Obstructive uropathy & prostatic hyperplasia | N40 | N13, N20-N21, N35, N40, N99.1 |
| Maternal deaths | O00-99 | – |
| Perinatal deaths, all causes (excl. stillbirths) | P00-96 | H31.1, P00, P03-95 |
| Congenital malformations | Q20-28 | Q00-99 |
| Misadventures to patients during surgical & medical care | Y60-69, Y83-84 | – |

## ANNEX 2: MODIFICATIONS IN TOBIAS AND YEH'S LIST

The ICD-9 disease codes listed in Tobias and Yeh did not always fit with the WHO ICD Basic Tabulation lists. Therefore, some slight modifications were made to the Tobias and Yeh's list in order to be able to calculate the amenable mortality rates based on the readily available WHO data.

| Tobias and Yeh's list | ICD-9 | WHO ICD Basic Tabulation List | Extra or missing causes |
|---|---|---|---|
| Tuberculosis | 010-018,137 | B02, B077 | |
| Selected invasive infections | 034(Streptococcal sore throat and scarlatina), 035 (Erysipelas), 036 (Meningococcal meningitis), 038 (Septicaemia), 084(malaria)<br><br>320 (Bacterial meningitis), 481-482 (Pneumococcal pneumonia and other bacterial pneumonia), 485 (Bronchopneumonia organism unspecified), 681-682 (Cellulitis and abscess of finger and toe, and Other cellulitis and abscess) | B035 (034, 035), B036 (036), B038 (038), B052 (084)<br><br>B220(320-322), B321(480-486), B420(680-686) | 10 extra causes: (321: Meningitis due to other organisms,322: Meningitis of unspecified cause, 480: Viral pneumonia, 483: Pneumonia due to other specified organism, 486:Pneumonia organism unspecified, 680: Carbuncle and furuncle , 683-686:Lymphadenitis,Impetigo, Pilonidal cyst, Other local infections of skin and subcutaneous tissue) |
| Colorectal cancer | 153, 154 | B093, B094 | |
| Malignant neoplasms of skin | 172-173 | B111, B112 | |
| Breast cancer (females only) | 174 | B113 | |
| Cervical cancer | 180 | B120 | |
| Uterine cancer | 179, 182 | B122 | |
| Bladder cancer | 188 | B126 | |
| Thyroid cancer | 193 | *B139(190,192-199)* | *One missing cause (193: Thyroid cancer)* |
| Hodgkin's disease | 201 | B140 | |
| Leukaemia (<45 years) | 204-208 | B141 | |
| Benign tumours | 210-229 | B15 | |
| Thyroid disorders | 240-246 | B180 | |
| Diabetes (type 2) | 250 | B181 | |
| Epilepsy | 345 | B225 | |
| Rheumatic & other valvular heart disease | 390-398 | B25 | |
| Hypertensive heart disease | 402 | B260(402,404) | One extra cause: (404: Hypertensive heart and kidney disease) |
| Ischemic heart disease (50%) | 410-414 | B27 | |
| Cerebrovascular disease | 430-438 | B29 | |
| Chronic obstructive pulmonary disease (>45 years) | 490-492, 496 | B323(490-493), B325(495, 496) | Two extra causes: (493: Asthma, 495: Extrinsic allergic alveolitis) |
| Asthma (<45 years) | 493 | *B323(490-493)* | *One missing cause (493: Asthma)* |
| Peptic ulcer disease | 531-534 | B341(531-533), *B349 (534-537, 555-558, 561, 563, 565-570, 572-573, 576-579)* | *One missing cause (534: Gastrojejunal ulcer)* |
| Acute abdomen, appendicitis, intestinal obstruction, cholecystitis/lithiasis, pancreatitis, hernia | 540-543, 550-553, 574-577 | B342, B343, B348(574-575.1), *B349 (534-537, 555-558, 561, 563, 565-570, 572-573, 576-579)* | *Two missing causes (576: Other disorders of biliary tract, 577: Diseases of pancreas)* |
| Nephritis & nephrosis | 403, 580-589, 591 | B260(402-404), B350(580-589) | (*) |
| Obstructive uropathy & prostatic hyperplasia | 592, 593.7,594, 598,599.6, 600 | B352(592,594), B359(591,593,596-599), B360(600) | Three extra causes (591: Hydronephrosis, 596: Other disorders of bladder, 597: Urethritis not sexually transmitted and urethral syndrome) |
| Perinatal deaths, all causes (excl. stillbirths) | 764-779 | B452(764-5),B453(767), B454(768-70),B455(773), B459(766,771-772,774-779) | |
| Congenital malformations | 740-759 | B44 | |

Note (*): Code 591 is not missing as it is included in the category just below.
Note: Codes *in italic and blue* are not included in the definition of amenable mortality.

Due to these modifications in the inclusion of causes, deaths by respiratory causes under Tobias and Yeh's list may be overestimated in those countries that were (are still) using the ICD-9 version.

## ANNEX 3: CAUSES CONTRIBUTION TO OVERALL AMENABLE MORTALITY

**Table A3.1 Contribution to overall amenable mortality, 2007 or latest available year (per cent)**

Panel A. Nolte and McKee's list

| Country | Infectious diseases | Cancers | Diseases of endocrine, nutritional & metabolic syst. | Diseases of nervous system | Diseases of circulatory system | Diseases of genitor-urinary system | Diseases of respiratory system | Diseases of digestive system | Perinatal mortality | External causes | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia[3] | 6.1% | 34.6% | 1.1% | 1.5% | 46.1% | 2.5% | 0.1% | 1.3% | 5.8% | 0.8% | 100% |
| Austria | 3.4% | 33.3% | 0.8% | 1.4% | 50.7% | 2.5% | 0.0% | 1.8% | 5.1% | 1.0% | 100% |
| Canada[3] | 7.0% | 32.6% | 1.2% | 0.8% | 46.3% | 3.5% | 0.1% | 1.5% | 6.7% | 0.3% | 100% |
| Chile[2] | 9.3% | 20.0% | 1.0% | 1.4% | 54.3% | 4.8% | 0.1% | 2.5% | 6.2% | 0.4% | 100% |
| Czech Republic | 8.4% | 25.5% | 0.5% | 0.8% | 57.1% | 2.3% | 0.0% | 2.4% | 2.8% | 0.1% | 100% |
| Germany[1] | 8.1% | 31.4% | 0.8% | 1.7% | 48.7% | 2.8% | 0.1% | 1.7% | 4.2% | 0.5% | 100% |
| Denmark[1] | 7.6% | 35.5% | 1.7% | 1.4% | 43.8% | 2.3% | 0.0% | 3.2% | 4.5% | 0.1% | 100% |
| Spain[2] | 9.1% | 32.9% | 0.5% | 0.7% | 45.7% | 3.7% | 0.1% | 1.4% | 5.5% | 0.4% | 100% |
| Estonia[2] | 6.2% | 16.1% | 0.9% | 2.2% | 69.4% | 0.7% | 0.1% | 2.2% | 2.0% | 0.1% | 100% |
| Finland | 4.7% | 23.5% | 1.5% | 1.6% | 61.4% | 0.7% | 0.1% | 3.0% | 3.3% | 0.1% | 100% |
| France[1] | 7.5% | 40.8% | 1.0% | 2.6% | 37.6% | 2.6% | 0.1% | 1.3% | 5.8% | 0.7% | 100% |
| United Kingdom | 10.1% | 28.9% | 0.7% | 1.8% | 48.0% | 1.4% | 0.2% | 2.8% | 5.8% | 0.3% | 100% |
| Greece | 4.9% | 23.9% | 0.4% | 0.6% | 59.8% | 4.8% | 0.2% | 0.9% | 4.0% | 0.4% | 100% |
| Hungary[2] | 3.0% | 21.7% | 0.9% | 0.7% | 66.4% | 1.1% | 0.1% | 2.9% | 3.3% | 0.0% | 100% |
| Ireland | 6.3% | 33.5% | 0.8% | 1.6% | 49.0% | 2.5% | 0.1% | 2.1% | 3.8% | 0.5% | 100% |
| Iceland | 1.3% | 34.1% | 0.5% | 1.0% | 52.9% | 1.5% | 0.0% | 3.0% | 5.7% | 0.0% | 100% |
| Israel*[2] | 9.5% | 33.2% | 1.3% | 1.3% | 37.4% | 11.5% | 0.1% | 1.1% | 4.5% | 0.1% | 100% |
| Italy[1] | 4.3% | 35.8% | 0.8% | 0.8% | 47.4% | 3.3% | 0.1% | 1.2% | 6.1% | 0.2% | 100% |
| Japan | 16.3% | 30.2% | 0.8% | 0.5% | 43.6% | 3.7% | 0.2% | 1.5% | 3.0% | 0.3% | 100% |
| Korea[1] | 10.1% | 18.9% | 1.7% | 1.0% | 58.0% | 5.0% | 0.1% | 1.2% | 3.8% | 0.2% | 100% |
| Luxembourg[2] | 11.8% | 26.9% | 0.0% | 2.1% | 50.8% | 2.4% | 0.0% | 1.5% | 4.2% | 0.3% | 100% |
| Mexico[1] | 12.4% | 14.2% | 5.9% | 1.2% | 43.9% | 8.1% | 0.2% | 3.4% | 10.5% | 0.2% | 100% |
| Netherlands | 10.0% | 39.4% | 0.9% | 1.2% | 39.3% | 2.1% | 0.0% | 1.2% | 5.8% | 0.1% | 100% |
| Norway[1] | 6.6% | 36.6% | 1.2% | 2.4% | 43.7% | 2.1% | 0.1% | 2.2% | 5.2% | 0.0% | 100% |
| New Zealand[2] | 1.8% | 37.6% | 1.3% | 1.6% | 49.7% | 1.3% | 0.0% | 1.4% | 5.3% | 0.1% | 100% |
| Poland[1] | 8.3% | 22.3% | 0.8% | 1.1% | 57.1% | 3.4% | 0.1% | 2.1% | 4.4% | 0.4% | 100% |
| Portugal[4] | 10.4% | 25.5% | 0.9% | 0.6% | 53.0% | 4.3% | 0.1% | 1.5% | 3.7% | 0.1% | 100% |
| Slovak Republic[2] | 9.3% | 20.0% | 0.6% | 1.3% | 61.0% | 2.7% | 0.0% | 1.9% | 3.1% | 0.0% | 100% |
| Slovenia | 6.1% | 33.4% | 0.2% | 0.9% | 49.5% | 2.4% | 0.0% | 2.9% | 3.2% | 1.4% | 100% |
| Sweden[1] | 4.8% | 32.9% | 1.0% | 1.6% | 51.6% | 2.0% | 0.1% | 2.4% | 3.5% | 0.2% | 100% |
| United States[2] | 10.8% | 22.1% | 1.9% | 0.4% | 51.5% | 5.7% | 0.1% | 1.1% | 6.0% | 0.4% | 100% |
| OECD | 7.6% | 28.9% | 1.1% | 1.3% | 50.8% | 3.2% | 0.1% | 2.0% | 4.7% | 0.3% | 100% |

Panel B. Tobias and Yeh's list

| Country | Infectious diseases | Cancers | Diseases of endocrine, nutritional & metabolic syst. | Diseases of nervous system | Diseases of circulatory system | Diseases of genitor-urinary system | Diseases of respiratory system | Diseases of digestive system | Perinatal mortality | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Australia[3] | 5.5% | 36.2% | 4.4% | 1.2% | 30.8% | 2.8% | 11.6% | 1.8% | 5.6% | 100% |
| Austria | 3.1% | 33.9% | 5.7% | 1.2% | 33.6% | 2.5% | 11.1% | 2.6% | 6.3% | 100% |
| Canada[3] | 6.1% | 32.6% | 5.9% | 0.7% | 32.2% | 3.5% | 10.3% | 2.2% | 6.6% | 100% |
| Chile[2] | 9.2% | 21.1% | 7.7% | 1.4% | 34.9% | 6.5% | 6.9% | 4.3% | 7.9% | 100% |
| Czech Republic | 8.3% | 28.9% | 3.3% | 0.8% | 41.7% | 2.9% | 6.4% | 4.3% | 3.4% | 100% |
| Germany[1] | 7.7% | 33.2% | 3.7% | 1.6% | 34.2% | 3.1% | 8.7% | 2.9% | 5.0% | 100% |
| Denmark[1] | 6.5% | 35.7% | 4.7% | 1.1% | 23.3% | 2.2% | 16.9% | 4.6% | 5.0% | 100% |
| Spain[2] | 8.5% | 35.8% | 3.4% | 0.6% | 29.2% | 3.7% | 9.8% | 2.9% | 6.1% | 100% |
| Estonia[2] | 7.0% | 19.5% | 2.4% | 2.3% | 56.2% | 2.6% | 2.7% | 4.1% | 3.2% | 100% |
| Finland | 4.7% | 25.9% | 2.5% | 1.5% | 45.2% | 0.9% | 7.8% | 5.7% | 5.8% | 100% |
| France[1] | 7.4% | 45.5% | 4.3% | 2.4% | 23.8% | 2.9% | 4.5% | 2.7% | 6.7% | 100% |
| United Kingdom | 9.3% | 29.6% | 1.7% | 1.5% | 32.8% | 1.5% | 13.2% | 3.7% | 6.7% | 100% |
| Greece | 5.3% | 30.4% | 2.5% | 0.6% | 45.5% | 4.8% | 3.7% | 0.9% | 6.3% | 100% |
| Hungary[2] | 3.2% | 23.9% | 4.1% | 0.7% | 48.5% | 2.0% | 9.2% | 4.3% | 4.2% | 100% |
| Ireland | 7.3% | 33.5% | 2.4% | 1.1% | 34.7% | 2.3% | 10.5% | 2.8% | 5.3% | 100% |
| Iceland | 2.1% | 36.3% | 1.9% | 0.9% | 35.9% | 1.2% | 13.8% | 2.5% | 5.3% | 100% |
| Israel*[2] | 8.3% | 34.5% | 9.7% | 1.1% | 22.4% | 10.3% | 6.5% | 1.8% | 5.4% | 100% |
| Italy[1] | 4.2% | 39.3% | 5.3% | 0.8% | 31.6% | 3.9% | 5.8% | 2.1% | 7.2% | 100% |
| Japan | 17.6% | 35.2% | 2.9% | 0.5% | 30.1% | 4.2% | 2.3% | 2.5% | 4.8% | 100% |
| Korea[1] | 10.8% | 23.0% | 11.0% | 1.1% | 35.7% | 6.5% | 5.4% | 2.0% | 4.6% | 100% |
| Luxembourg[2] | 11.4% | 29.8% | 2.4% | 1.9% | 33.4% | 2.8% | 12.8% | 1.9% | 3.6% | 100% |
| Mexico[1] | 9.2% | 12.2% | 26.0% | 0.9% | 22.8% | 9.2% | 7.0% | 3.8% | 9.0% | 100% |
| Netherlands | 8.7% | 40.3% | 3.9% | 1.0% | 23.4% | 1.9% | 12.7% | 1.8% | 6.2% | 100% |
| Norway[1] | 5.9% | 37.5% | 2.9% | 2.0% | 27.0% | 2.0% | 14.4% | 2.6% | 5.7% | 100% |
| New Zealand[2] | 2.1% | 36.8% | 5.0% | 1.3% | 31.8% | 2.1% | 13.4% | 1.5% | 6.2% | 100% |
| Poland[1] | 8.5% | 27.1% | 3.0% | 1.1% | 40.0% | 3.6% | 6.4% | 4.5% | 5.7% | 100% |
| Portugal[4] | 10.9% | 29.0% | 6.7% | 0.6% | 34.6% | 4.5% | 6.1% | 2.8% | 4.8% | 100% |
| Slovak Republic[2] | 9.9% | 25.2% | 2.2% | 1.5% | 45.1% | 3.3% | 4.3% | 4.1% | 4.5% | 100% |
| Slovenia | 6.3% | 38.4% | 2.5% | 0.8% | 34.1% | 2.5% | 5.9% | 4.6% | 4.8% | 100% |
| Sweden[1] | 4.4% | 35.1% | 3.7% | 1.4% | 35.4% | 2.2% | 9.2% | 3.3% | 5.3% | 100% |
| United States[2] | 9.2% | 21.9% | 5.8% | 0.4% | 34.2% | 6.1% | 15.0% | 1.7% | 5.6% | 100% |
| OECD | 7.4% | 31.2% | 4.9% | 1.2% | 34.3% | 3.6% | 8.9% | 3.0% | 5.6% | 100% |

Note: (1) 2006 for France, Germany, Denmark, Korea, Italy, Mexico, Norway, Poland and Sweden ; (2) 2005 data for Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States ; (3) 2004 data for Australia and Canada; (4) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

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**Table A3.2 Contribution to overall amenable mortality, 2007 or latest available year (deaths per 100 000 population)**

Panel A. Nolte and McKee's list

| Country | Infectious diseases | Cancers | Diseases of endocrine, nutritional & metabolic syst. | Diseases of nervous system | Diseases of circulatory system | Diseases of genitor-urinary system | Diseases of respiratory system | Diseases of digestive system | Perinatal mortality | External causes | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Australia3 | 4.2 | 23.7 | 0.8 | 1.0 | 31.6 | 1.7 | 0.1 | 0.9 | 4.0 | 0.6 | 68.5 |
| Austria | 2.3 | 23.1 | 0.5 | 1.0 | 35.2 | 1.7 | 0.0 | 1.3 | 3.5 | 0.7 | 69.4 |
| Canada3 | 5.2 | 24.1 | 0.9 | 0.6 | 34.3 | 2.6 | 0.1 | 1.1 | 4.9 | 0.2 | 74.0 |
| Chile2 | 9.5 | 20.5 | 1.0 | 1.5 | 55.6 | 4.9 | 0.1 | 2.6 | 6.4 | 0.4 | 102.5 |
| Czech Republic | 10.6 | 31.9 | 0.7 | 1.0 | 71.4 | 2.9 | 0.1 | 3.0 | 3.5 | 0.2 | 125.0 |
| Germany1 | 6.6 | 25.5 | 0.7 | 1.4 | 39.5 | 2.3 | 0.0 | 1.4 | 3.4 | 0.4 | 81.2 |
| Denmark1 | 6.6 | 30.7 | 1.4 | 1.2 | 38.0 | 2.0 | 0.0 | 2.7 | 3.9 | 0.1 | 86.6 |
| Spain2 | 6.4 | 23.1 | 0.3 | 0.5 | 32.2 | 2.6 | 0.1 | 1.0 | 3.9 | 0.3 | 70.4 |
| Estonia2 | 12.4 | 32.1 | 1.8 | 4.4 | 138.4 | 1.5 | 0.2 | 4.4 | 4.0 | 0.2 | 199.4 |
| Finland | 3.7 | 18.5 | 1.1 | 1.3 | 48.2 | 0.6 | 0.0 | 2.4 | 2.6 | 0.1 | 78.6 |
| France1 | 4.4 | 24.0 | 0.6 | 1.5 | 22.1 | 1.5 | 0.0 | 0.7 | 3.4 | 0.4 | 58.8 |
| United Kingdom | 8.7 | 24.9 | 0.6 | 1.5 | 41.3 | 1.2 | 0.1 | 2.4 | 5.0 | 0.3 | 86.1 |
| Greece | 3.9 | 18.9 | 0.3 | 0.5 | 47.3 | 3.8 | 0.2 | 0.7 | 3.2 | 0.3 | 79.1 |
| Hungary2 | 5.8 | 42.7 | 1.7 | 1.5 | 130.6 | 2.1 | 0.1 | 5.7 | 6.5 | 0.1 | 196.8 |
| Ireland | 5.2 | 27.5 | 0.6 | 1.3 | 40.3 | 2.1 | 0.1 | 1.7 | 3.1 | 0.4 | 82.3 |
| Iceland | 0.8 | 20.9 | 0.3 | 0.6 | 32.4 | 0.9 | 0.0 | 1.8 | 3.5 | 0.0 | 61.3 |
| Israel*2 | 7.7 | 26.9 | 1.1 | 1.0 | 30.4 | 9.3 | 0.1 | 0.9 | 3.6 | 0.1 | 81.1 |
| Italy1 | 2.8 | 23.3 | 0.5 | 0.5 | 30.9 | 2.1 | 0.0 | 0.8 | 4.0 | 0.1 | 65.1 |
| Japan | 10.8 | 20.1 | 0.5 | 0.3 | 29.0 | 2.4 | 0.1 | 1.0 | 2.0 | 0.2 | 66.4 |
| Korea1 | 8.7 | 16.3 | 1.4 | 0.9 | 50.0 | 4.3 | 0.1 | 1.0 | 3.3 | 0.1 | 86.2 |
| Luxembourg2 | 8.8 | 20.1 | 0.0 | 1.5 | 37.9 | 1.8 | 0.0 | 1.1 | 3.1 | 0.2 | 74.6 |
| Mexico1 | 17.0 | 19.4 | 8.1 | 1.6 | 59.9 | 11.1 | 0.3 | 4.6 | 14.3 | 0.2 | 136.5 |
| Netherlands | 6.8 | 26.9 | 0.6 | 0.8 | 26.8 | 1.5 | 0.0 | 0.8 | 3.9 | 0.1 | 68.3 |
| Norway1 | 4.6 | 25.5 | 0.8 | 1.7 | 30.4 | 1.4 | 0.0 | 1.5 | 3.6 | 0.0 | 69.6 |
| New Zealand2 | 1.5 | 31.9 | 1.1 | 1.4 | 42.2 | 1.1 | 0.0 | 1.2 | 4.5 | 0.1 | 85.0 |
| Poland1 | 11.5 | 30.7 | 1.0 | 1.5 | 78.7 | 4.7 | 0.1 | 2.9 | 6.1 | 0.5 | 137.8 |
| Portugal4 | 11.2 | 27.4 | 0.9 | 0.7 | 57.0 | 4.6 | 0.1 | 1.7 | 3.9 | 0.1 | 107.6 |
| Slovak Republic2 | 17.5 | 37.5 | 1.0 | 2.5 | 114.5 | 5.2 | 0.1 | 3.5 | 5.8 | 0.0 | 187.7 |
| Slovenia | 5.6 | 30.5 | 0.1 | 0.8 | 45.1 | 2.1 | 0.0 | 2.7 | 2.9 | 1.3 | 91.2 |
| Sweden1 | 3.3 | 22.4 | 0.7 | 1.1 | 35.1 | 1.3 | 0.0 | 1.7 | 2.4 | 0.2 | 68.1 |
| United States2 | 11.1 | 22.8 | 2.0 | 0.4 | 53.1 | 5.9 | 0.1 | 1.1 | 6.2 | 0.4 | 103.1 |
| OECD | 7.3 | 25.6 | 1.1 | 1.2 | 50.3 | 3.0 | 0.1 | 1.9 | 4.3 | 0.3 | 95.1 |

Panel B. Tobias and Yeh's list

| Country | Infectious diseases | Cancers | Diseases of endocrine, nutritional & metabolic syst. | Diseases of nervous system | Diseases of circulatory system | Diseases of genitor-urinary system | Diseases of respiratory system | Diseases of digestive system | Perinatal mortality | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Australia3 | 4.5 | 29.7 | 3.6 | 1.0 | 25.2 | 2.3 | 9.6 | 1.5 | 4.6 | 82.0 |
| Austria | 2.5 | 27.6 | 4.6 | 1.0 | 27.5 | 2.1 | 9.1 | 2.1 | 5.1 | 81.6 |
| Canada3 | 5.3 | 28.4 | 5.1 | 0.6 | 28.0 | 3.0 | 9.0 | 1.9 | 5.7 | 87.0 |
| Chile2 | 10.1 | 23.1 | 8.4 | 1.5 | 38.1 | 7.1 | 7.6 | 4.7 | 8.6 | 109.2 |
| Czech Republic | 10.6 | 36.9 | 4.2 | 1.0 | 53.2 | 3.7 | 8.2 | 5.5 | 4.3 | 127.6 |
| Germany1 | 6.8 | 29.3 | 3.2 | 1.4 | 30.2 | 2.7 | 7.7 | 2.5 | 4.4 | 88.3 |
| Denmark1 | 6.9 | 38.0 | 5.0 | 1.2 | 24.9 | 2.3 | 18.0 | 4.8 | 5.3 | 106.5 |
| Spain2 | 6.8 | 28.7 | 2.7 | 0.5 | 23.4 | 3.0 | 7.9 | 2.3 | 4.9 | 80.0 |
| Estonia2 | 13.4 | 37.2 | 4.5 | 4.4 | 107.0 | 4.9 | 5.1 | 7.8 | 6.2 | 190.3 |
| Finland | 4.0 | 22.3 | 2.2 | 1.3 | 38.9 | 0.8 | 6.7 | 4.9 | 5.0 | 86.0 |
| France1 | 4.7 | 28.9 | 2.7 | 1.5 | 15.1 | 1.8 | 2.9 | 1.7 | 4.2 | 63.6 |
| United Kingdom | 9.4 | 30.0 | 1.7 | 1.5 | 33.3 | 1.6 | 13.4 | 3.8 | 6.8 | 101.5 |
| Greece | 4.1 | 23.8 | 1.9 | 0.5 | 35.7 | 3.8 | 2.9 | 0.7 | 4.9 | 78.5 |
| Hungary2 | 6.5 | 49.3 | 8.4 | 1.5 | 99.8 | 4.0 | 19.0 | 8.8 | 8.6 | 205.8 |
| Ireland | 6.9 | 31.8 | 2.3 | 1.1 | 32.9 | 2.2 | 10.0 | 2.6 | 5.1 | 94.8 |
| Iceland | 1.5 | 26.2 | 1.4 | 0.6 | 25.9 | 0.9 | 10.0 | 1.8 | 3.9 | 72.3 |
| Israel*2 | 7.9 | 32.6 | 9.2 | 1.0 | 21.2 | 9.7 | 6.2 | 1.7 | 5.1 | 94.5 |
| Italy1 | 3.0 | 27.9 | 3.7 | 0.5 | 22.4 | 2.8 | 4.1 | 1.5 | 5.1 | 71.0 |
| Japan | 10.8 | 21.6 | 1.8 | 0.3 | 18.5 | 2.6 | 1.4 | 1.5 | 2.9 | 61.5 |
| Korea1 | 8.8 | 18.7 | 9.0 | 0.9 | 29.2 | 5.3 | 4.4 | 1.6 | 3.8 | 81.7 |
| Luxembourg2 | 9.2 | 24.0 | 1.9 | 1.5 | 26.9 | 2.3 | 10.4 | 1.6 | 2.9 | 80.7 |
| Mexico1 | 16.3 | 21.7 | 46.3 | 1.6 | 40.6 | 16.3 | 12.5 | 6.8 | 16.0 | 177.9 |
| Netherlands | 7.1 | 33.0 | 3.2 | 0.8 | 19.1 | 1.6 | 10.4 | 1.5 | 5.1 | 81.8 |
| Norway1 | 5.0 | 31.6 | 2.4 | 1.7 | 22.7 | 1.7 | 12.2 | 2.2 | 4.8 | 84.4 |
| New Zealand2 | 2.2 | 39.2 | 5.3 | 1.4 | 33.9 | 2.2 | 14.3 | 1.6 | 6.6 | 106.7 |
| Poland1 | 11.8 | 37.3 | 4.2 | 1.5 | 55.1 | 5.0 | 8.8 | 6.2 | 7.8 | 137.7 |
| Portugal4 | 11.7 | 31.3 | 7.2 | 0.7 | 37.2 | 4.8 | 6.5 | 3.0 | 5.2 | 107.7 |
| Slovak Republic2 | 16.9 | 43.2 | 3.8 | 2.5 | 77.3 | 5.7 | 7.3 | 6.9 | 7.7 | 171.3 |
| Slovenia | 6.1 | 36.8 | 2.3 | 0.8 | 32.7 | 2.4 | 5.7 | 4.4 | 4.6 | 95.8 |
| Sweden1 | 3.4 | 27.3 | 2.9 | 1.1 | 27.6 | 1.7 | 7.2 | 2.6 | 4.1 | 77.9 |
| United States2 | 11.4 | 27.1 | 7.2 | 0.4 | 42.4 | 7.6 | 18.6 | 2.1 | 7.0 | 123.8 |
| OECD | 7.6 | 30.5 | 5.6 | 1.2 | 37.0 | 3.8 | 8.9 | 3.3 | 5.7 | 103.5 |

Note: (1) 2005 data for Chile, Hungary, Luxembourg, New Zealand, Slovak Republic, Spain and United States; (2) 2004 data for Australia and Canada; (3) 2003 data for Portugal.

Source: WHO Mortality Database 2010, OECD calculations.

*StatLink* http://dx.doi.org/10.1787/888932368992

## REFERENCES

Holland, W.W., A.P. Fitzgerald, S.J. Hildrey & S.J. Phillips (1994), "Heaven can wait", *J Public Health*, 16(3): 321-330.

Instituto Nacional de Estadsitica y Geografia (2009), available at: http://www.inegi.org.mx/inegi/default.aspx?s=est&c=10202 Mexico.

Jougla, E. *et al.*, (2001), *Comparability and Quality Improvement of the European Causes of Death Statistics*, Institut national de la santé et de la recherche médicale, Le Vésinet, France.

Joumard, I., C. André, C. Nicq, O. Chatal (2008), "Health Status Determinants: Lifestyle, Environment, Health Care Resources and Efficiency", OECD Economics Department Working Papers, No. 627.

Mackenbach, J.P., M.H. Bouvier-Colle, E. Jougla (1990), "Avoidable mortality and health services: a review of aggregate data studies", *J Epidmiol Commun Health*, 44(2):106-111.

Mathers, C.D., D. Ma Fat, M. Inoue, C. Rao, A.D. Lopez (2005), "Counting the dead and what they died from: an assessment of the global status of cause of death data", *Bulletin of the World Health Organization*, 83(3):171-177.

Newey, C., E. Nolte, M. McKee & E. Mossialos (2004), *Avoidable Mortality in the Enlarged European Union*, Institut des Sciences de la Santé, Paris.

Nolte, E. & M. McKee (2004), *Does Health Care Save Lives? Avoidable Mortality Revisited*, Nuffield Trust, London.

Nolte, E. & M. McKee (2008), "Measuring the Health of Nations: Updating an Earlier Analysis", *Health Affairs,* 27(1):58–71.

OECD (2010), *Health care systems' efficiency and policy settings*, OECD, Paris.

OECD Health Data (2010), website available at www.ecosante.org.

Page, A., M. Tobias, J. Glover, C. Wright, D. Hetzel, E. Fisher. (2006), *Australian and New Zealand Atlas of Avoidable Mortality*, University of Adelaide, Adelaide.

Rutstein, D., W. Berenberg, T.C. Chalmers, C.G. Child, A.P. Fishman, E.B. Perrin (1976), "Measuring the Quality of Medical Care. A Clinical Method", *New England Journal of Medicine*, 294(11): 582–588.

Tobias, M. (2009), "Amenable Mortality: Concept and Application", http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pres_2009-MeaMortWs-con/$File/Tobias.pdf, accessed on 4 January 2011.

Tobias, M. & L. Yeh (2009), "How much does health care contribute to health gain and to health inequality? Trends in amenable mortality in New Zealand 1981-2004", *Aust N Z Public Health*, 33:70-78.

Westerling, R. (1992), "Avoidable causes of death in Sweden 1974-85", *Qual Assur Health Care*, 4(4):319-328.

World Health Organization (2010), WHO Mortality Database Tables, http://www.who.int/healthinfo/morttables/en/index.html, accessed on 4 January 2011.

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