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Policy relevant determinants of health: an international perspective

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Abstract

Background: International comparisons can provide clues to understanding some of the important policy-related determinants of health, including those related to the provision of health care services. An earlier study indicated that the strength of the primary care infrastructure of a health services system might be related to overall costs of health services. The purpose of the current research was to determine the robustness of the findings in the light of the passage of 5–10 years, the addition of two more countries, and the findings of other research on the possible importance of other determinants of country health levels. *Methods:* Thirteen industrialized countries, all with populations of at least 5 million, were characterized by the relative strength of their primary care infrastructure, the degree of national income inequality, and a major manifestation of a behavioral determinant of health that is amenable to policy intervention (smoking), using international data sets and national informants. Health system and primary care practice characteristics were judged according to pre-set criteria. Major indicators of health were used as dependent variables, as were health care costs. *Findings:* The stronger the primary care, the lower the costs. Countries with very weak primary care infrastructures have poorer performance on major aspects of health. Although countries that are intermediate in the strength of their primary care generally have levels of health at least as good as those with high levels of primary care, this is not the case in early life, when the impact of strong primary care is greatest. A subset of characteristics (equitable distribution of resources, publicly accountable universal financial coverage, low cost sharing, comprehensive services, and family-oriented services) distinguishes countries with overall good health from those with poor health at all ages. Neither income inequality nor smoking status accurately identified those countries with either consistently high or

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consistently poor performance on the health indicators. *Interpretation:* A certain level of health care expenditures may be required to achieve overall good health levels, even in the presence of strong primary care infrastructures. Very low costs may interfere with achievement of good health, particularly at older ages, although very high levels of costs may signal excessive and potentially health-compromising care. Five policy-relevant characteristics appear to be related to better population health levels. There is no consistent relationship between income inequality, smoking, and health levels as measured by various indicators of health in different age groups. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Primary care; Income inequality; Life expectancy; Postneonatal mortality

1. Introduction

An international comparison using data from the mid and late 1980s [1] showed that western industrialized countries differed with regard to the strength of their primary care infrastructure and suggested that this was one reason for differences in various aspects of the health of their populations and costs of health care. Relatively recent comparisons of countries (although with older data) have added a focus on socioeconomic characteristics, and have suggested that poorer health follows greater disparities in income [2] or cultural and behavioral characteristics of populations [3]. The purpose of the current research was to determine the robustness of the findings in the light of the passage of 5–10 years, the addition of two more countries, and the findings of other research on the possible importance of other determinants of country health levels.

Data from the early and mid 1990s were used to determine the robustness of the original findings on the importance of primary care outcomes to a variety of health outcomes as well as costs of care, in the face of some evidence on other characteristics of the countries (income inequality and smoking). The original comparison was limited to western industrialized nations with populations over 5 million, for which comparable data were available. The current study added two countries: France and Japan. For the former, data are now available whereas they were not previously. Japan, even though not a ‘western’ nation, was added because of interest in its reportedly good performance on most common health indicators. Data on income inequality were also added because of recent findings concerning its possible salience to overall health levels, and the behavioral characteristic of smoking was included as a potential major explanatory factor for differences in overall health.

2. Methods

Data were sought to enable the characterization of countries according to the strength of their primary care, considering both those characteristics of health system policy that are conducive to primary care, as well as characteristics of practice that reflect good primary care.

Health system characteristics include the extent to which the system regulates the distribution of resources throughout the country; the mode of financing of primary care services; the modal type of primary care practitioner; the percentage of active physicians involved in primary care versus those in conventional ‘specialty’ care; the ratio of average professional earnings of primary care physicians compared with other specialists; the requirement for cost sharing by patients; the requirement for patient lists to identify the community served by practices; 24 h access arrangements; and the strength of academic departments of primary care or general practice. The first five of these characteristics were used previously [4] and were obtained from widely available sources, primarily the Organization for Economic Cooperation and Development (OECD) [5]. The last four were added in order to provide better characterization of primary care training and organization; these were obtained from knowledgeable individuals in each country.

The practice characteristics include first-contact care; longitudinality (person-focused care over time); comprehensiveness; coordination; family-centeredness; and community orientation. As no country routinely collects data on these characteristics, information was sought from individuals who had published in the peer-reviewed literature on the subject of primary care in their countries [6]. There were no disagreements among informants in the scoring of these characteristics.

To rate the primary care orientation of each country, criteria for scoring were developed for each of the nine health system characteristics and six practice characteristics. Each was assigned a score from 0 (connoting the absence or poor development of the characteristic) to 2 (connoting a high level of development of the characteristic). A score of 1 was assigned if there was moderate development of the characteristic. The unweighted scores for primary care characteristics for each country were summed and then averaged to derive a total primary care score.

A table with the criteria used to score each of these characteristics is provided in [6] and is also available on request. Appendix A provides the scoring distributions of the primary care characteristics for each country.

The scores for each country reflect the characteristics of the most common form of services and not other systems that may provide primary care but only to limited segments of the population.

Data on major health indicators were obtained from OECD and World Health Organization published data (sources are provided in [6]). Each country was then ranked according to its position on each of these indicators.

As a result of recent attention to the relationship between income inequity and health levels in different countries [2], we examined the ranking of the countries for equity in distribution of income in two ways: (1) according to the ratio of the percentage of earned income accruing to the top 10% of the population to the percentage accruing to the bottom 20%, and (2) according to the Gini coefficient based on disposable income.

As some of the differences in ranking on health indicators are likely to be related to differences in the distribution of behavioral risk factors that are amenable to policy interventions in the different countries and comparable data are available on one of these (smoking), we also include data on the percentage of individuals who smoke, for males and females separately.

Pearson's correlation coefficient was used to measure the inter-correlations of primary care characteristics, the relationship between primary care system and practice characteristics, and between primary care, health indicators, income distribution, and smoking, and Spearman's rank order correlation was performed to measure the relationship between primary care ranking and ranking on health indicators. All significance levels were set at $P < 0.05$.

3. Results

Table 1 provides the primary care scores for the countries. Three groups emerge according to the strength of primary care infrastructure: those with poor primary care infrastructure (with total primary care score less than 10), those in the middle (with primary care score between 10 and 20), and those with strong primary care (with primary care score greater than 20). The ranking of scores for practice characteristics was highly related to those for system characteristics, thus indicating the clear relationship between national policies and professional practices ($r = .92$, $P < 0.001$) (Fig. 1). Significant correlations were also observed among individual primary care measures ($P < 0.01$). A correlation matrix is available on request.

Table 1
Primary care scores

Country	System score	Practice score	Total score	Total score (average)	Health system costs (rank)
<i>Low primary care</i>					
Belgium	5.6	0.0	5.6	0.4	1693 7
France	5.0	0.0	5.0	0.3	1978 10
Germany	6.0	0.0	6.0	0.4	2222 12
United States	4.0	1.5	5.5	0.4	3708 13
<i>Intermediate primary care</i>					
Australia	10.0	7.0	17.0	1.1	1776 9
Canada	11.5	6.0	17.5	1.2	2002 11
Japan	8.5	4.0	12.5	0.8	1581 6
Sweden	10.0	4.0	14.0	0.9	1405 4
<i>High primary care</i>					
Denmark	16.0	10.0	26.0	1.7	1430 5
Finland	15.0	7.0	22.0	1.5	1389 3
The Netherlands	13.0	10.0	23.0	1.5	1756 8
Spain	12.5	8.0	20.5	1.4	1131 1
United Kingdom	18.0	11.0	29.0	1.9	1304 2

Countries are arranged in three groupings according to strength of primary care. The higher the score, the stronger the primary care.

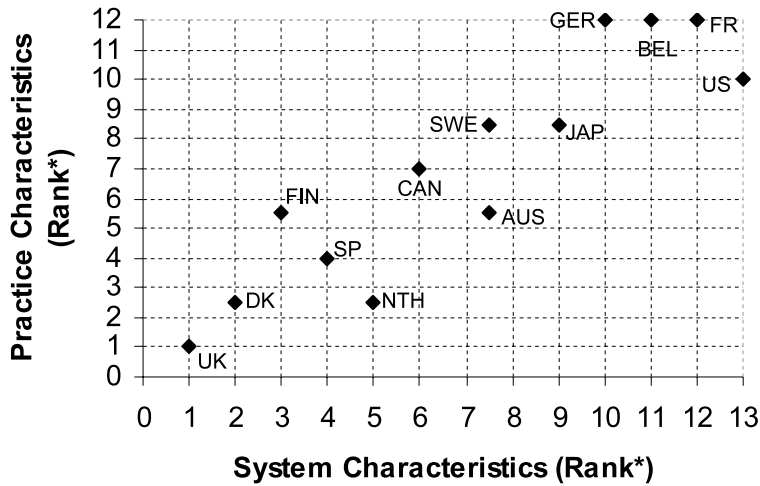


Fig. 1. System and practice characteristics facilitating primary care, early–mid 1990s.

The better the orientation towards primary care, the lower the total health care costs (Fig. 2). This relationship between lower costs and stronger primary care was statistically significant ($r = -0.61$, $r_s = -0.63$, $P < 0.001$), even when United States, with its very high costs, was removed from the analysis.

The primary care score was highly and significantly related (both in absolute value as well as on the ranks for the health outcomes) to the postneonatal mortality rate ($r = -0.74$, $r_s = -0.69$, $P < 0.001$). In addition, it was inversely (although not significantly due to small number of observations) related to low birthweight ($r = -0.38$, $r_s = -0.40$).

Appendix B provides a summary of all dependent variables.

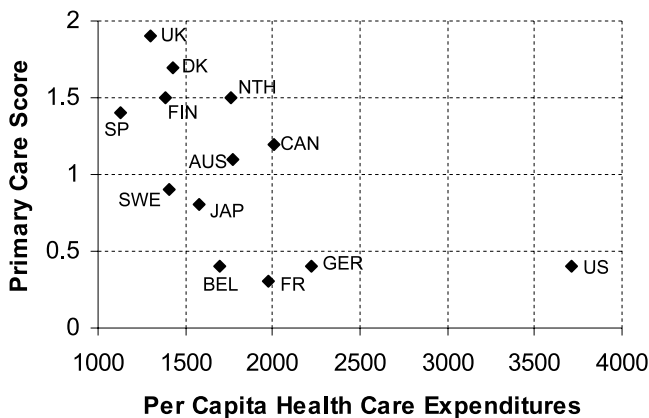


Fig. 2. Primary care score vs. health care expenditures, 1997.

Table 2

Average rankings* for health indicators in infancy†, for countries grouped by primary care orientation

	Low Birth Weight (1993)	Neonatal Mortality (1993)	Postneonatal Mortality (1993)	Infant Mortality (1996)
Low Primary Care	9.5	7.8	11.5	8.8
Belgium				
France				
Germany				
US				
Intermediate Primary Care	7.3	5.3	5.5	6.0
Australia	} 5.9	} 6.7	} 5.0	} 6.2
Canada				
Japan				
Sweden				
High Primary Care	4.8	7.8	4.6	6.4
Denmark				
Finland				
Netherlands				
Spain				
UK**				

*Best level of health indicator is ranked 1; worst is ranked 13. Thus, lower average ranks indicate better performance. The ranks for each of the countries in each group represent the average rank for the countries in the group; †, the actual values for the individual countries are provided in Appendix B. **, England and Wales only.

Table 2 indicates that the average rank for all indicators in infancy, but especially low birthweight ratios and postneonatal mortality rate, are worse in the group of countries characterized by poor primary care. Table 3 shows that the average ranking on various categories of years of potential life lost is generally poorer in countries with a poor orientation to primary care.

Table 4 provides information on average rankings for the three groups of countries for life expectancy starting in middle age. The strongest primary care countries fall progressively behind with increasing age, whereas those in the middle and worse groups do relatively better.

An average rank for 16 health indicators was calculated. These 16 indicators included low birth weight; neonatal mortality; postneonatal mortality; total infant mortality; life expectancy at ages 1, 15, 40, 65, and 80 for males and females separately; and years of potential life lost from all but external causes for males and females separately. The average rank, in order, from best to worst was: Japan, Sweden, Canada, France, Australia, Spain, Finland, The Netherlands, United Kingdom, Denmark, Belgium, United States, and Germany.

The same countries were also ranked according to the two health indicators available from the World Health Report 2000. These rankings paralleled the rankings obtained in this study, with the countries in the high primary care group doing best on the child survival equity indicator, and the countries in the worst primary care group doing worse than the better primary care groups for the DALES indicator [7].

As Table 5 (which is organized according to the ranking of the 16 health indicators for the countries) [8,9] indicates, smoking rates are higher in men than in women, but particularly so in Japan. In Canada, Australia, United States, Sweden, Denmark and United Kingdom, the rates of smoking among women approach or equal those for men. On average, countries with low rates of smoking include Sweden, United States, Finland, Germany, and France. Those with high rates include Denmark and The Netherlands, whereas Japan (high in males only), Canada, Australia, Belgium, and Spain fall in the middle group. There is no evident consistent relationship between ranking on smoking and ranking on health.

Table 6, which is also organized according to the ranking of the 16 health indicators, shows that income distribution differs markedly according to whether it was characterized by the Gini coefficient and based on disposable income (after taxes and transfers from governmental assistance) or whether it was characterized by the ratio of earned income (before taxes and transfers from governmental assistance) of the top 10% to the bottom 20%. In neither case is there a clear relationship of rankings with rankings for primary care or the health outcomes.

Overall averages of ranks provide little information about the ranks for the individual health indicators. For example, Japan and Canada rank relatively high on most indicators. Sweden ranks high on all indicators except for those related to survival in females (relative to that of males) up through age 40. Countries with generally poor ranks include Germany, United States, Denmark, and Belgium, although United States has a relatively high rank for life expectancy at the oldest ages. Countries that do especially well on life expectancy and years of potential life

Table 3
Average rankings for various categories of years of potential life lost† in countries grouped by primary care orientation

	All Except Suicide		Suicide		All Except External	
	Female	Male	Female	Male	Female	Male
Low Primary Care	9.5	10.8	7.3	8.3	8.8	10.8
Belgium						
France						
Germany						
United States						
Intermediate Primary Care	3.8	2.8	7.0	7.3	3.8	3.5
Australia	} 5.9	} 5.3	} 6.9	} 6.0	} 6.2	} 5.6
Canada						
Japan						
Sweden						
High Primary Care	7.6	7.4	6.8	5.8	8.2	7.0
Denmark						
Finland						
Netherlands						
United Kingdom						

†, The actual values for the individual countries are provided in Appendix B. Source: OECD Health Data, 1998 [5].

Table 4

Average rankings* for life expectancy at ages 40, 65, and 80† for countries grouped by primary care orientation

	Age 40		Age 65		Age 80	
	Female	Male	Female	Male	Female	Male
Low Primary Care	7.8	9.5	8.0	8.0	7.4	6.9
Belgium						
France						
Germany						
United States						
Intermediate Primary Care	4.0	2.5	3.8	3.5	3.6	4.3
Australia	} 6.7	} 5.9	} 6.6	} 6.6	} 6.8	} 7.1
Canada						
Japan						
Sweden						
High Primary Care	8.8	8.6	8.8	9.0	9.5	9.3
Denmark						
Finland						
Netherlands						
United Kingdom						

*, Best level of health indicator is ranked 1; worst is ranked 13. Thus, lower average ranks indicate better performance. The ranks for each of the countries in each group represent the average rank for the countries in the group; †, The actual values for the individual countries are provided in Appendix B; **, England and Wales only.

lost in females are France and Spain (except for the very old in Spain). Finland performs especially well on infant indicators and years of potential life lost for all but external causes, although its good ranking on the latter, in the face of poor life expectancy, suggests poor performance on external causes of death and non-preventable disease mortality. Australia performs well on survival statistics, but not as well on others. Indicators of health in the elderly are relatively poor in The Netherlands and Finland, and female survival is relatively poor in United Kingdom.

4. Discussion

Within the past 15 years, almost all countries have undergone some type of health care reform, mostly directed at conserving costs. Existing international comparisons [10,11] have provided descriptive data on some important aspects of these health systems, but these have lacked information on both socio-economic characteristics or primary care characteristics that could be related to differences in population health levels. Except for the general finding that there is little association between costs of a health system and population health, more extensive analyses are lacking.

Moreover, it is apparent that the health data for the middle group of countries are better for several indicators of health than in countries with the best primary

care scores. This better performance is suggested for those indicators past infancy (Table 6), as well as for rankings for indicators past childhood (DALES) in the World Health Report [7]. The former countries spent more on their health systems than the latter; costs in the former group ranged from \$1405 (Sweden) to \$2002 (Canada) whereas they ranged from \$1131 (Spain) to \$1756 (The Netherlands) in the latter group. Average costs were \$1691 in the middle group and \$1402 in the latter group. Since health is influenced not only by primary care but also by appropriate referral care, it is possible that underspending accounts for suboptimal performance later in life in the countries with the best primary care systems.

A major threat to the conclusions of this analysis concerns the adequacy and comparability of data. The comparability of the information on primary care characteristics is likely to be relatively good, as all judges worked from definitions and criteria that were provided to them. The data obtained from the OECD, as well as those from the World Health Organization, are widely used by authors writing for peer-reviewed journals (for example, [10,11]), and while this does not assure reliability and validity, it at least indicates their general acceptance by the research and policy-making communities.

The relationship between the strength of primary care within the overall health services system and good performance, particularly with regard to lower costs of care and particularly relevant measures of health, is the same in the 1990s as in the 1980s, even though different sources of information were used to characterize primary care and additional measures were included. While degree of income disparities is likely to be a consideration, it is clearly not the sole consideration. Japan, Canada, and Sweden are countries with excellent health levels, but only

Table 5
Percentage of individuals (rank of country) who smoke at ages 15 and older, early–mid 1990s*

Country	Female		Male	
	(%)	Rank	(%)	Rank
Japan	13.3	1.5	60.4	13
Sweden	26.6	10	25.2	1
Canada	26.0	9	26.0	2
France	20.0	1.5	38.0	9
Australia	23.8	7	28.2	4
Spain	21.0	4	44.0	11
Finland	20.0	4	33.0	7
The Netherlands	30.5	12	42.9	10
United Kingdom	28.0	11	29.0	5
Denmark	40.1	13	45.9	12
Belgium	21.0	4	31.0	6
United States	24.6	8	28.6	3
Germany	21.5	6	36.8	8

Countries are ordered according to overall rank on health indicators; *, All countries 1992, except Canada (1991), Spain (1993); Source, OECD Health Data, 1998 [5].

Table 6
 Ranking[†] of countries by income inequality

Country	10–20 Ratio based on earned income*	Gini coefficient based on disposable income**
Japan	1	11
Sweden	2	2
Canada	9	7
France	10	8
Australia	12	10
Spain	3	9
Finland	6	1
The Netherlands	4	5
United Kingdom	13	12
Denmark	8	4
Belgium	5	3
United States	11	13
Germany	7	6

*, Ranks closer to 1 indicate less income inequality; **, Ratio of percentage of income earned by top 10% to that of lowest 20% of people. All data from late 1980s except Belgium (1978–1979) and Japan (1979). World Bank. World Development Report 1994 [22]. The rankings using a 20/80 ratio are very similar: 1, 4, 8, 10, 12, 6, 7, 2, 13, 9, 3, 11, 5 for the countries, respectively; †, Based on disposable income. All data from late 1980s to early 1990s. Smeeding 1997 [14].

Sweden has relatively equitable distributions of income regardless of the measure used. Income in The Netherlands and Belgium is relatively equitably distributed, but health levels among the elderly are relatively poor in The Netherlands, and health (at least as measured by the indicators used in this study) are poor overall in Belgium. A recent study in western industrialized countries [12] has confirmed the absence of a relationship between health and either income inequality or psychological factors; that study did not include any consideration of health system characteristics as potential influences on health of the population.

Not all health indicators, particularly those sensitive to access to effective specialist care, would be expected to reflect the adequacy of the primary care system alone. On the basis of extrapolation from existing data [8], as well as a consensus of expert opinion [6], we postulated that of the available indicators in this study, only postneonatal mortality would be particularly reflective of good primary care. Other analyses [9] also confirm the sensitivity of postneonatal mortality to primary care physician availability. (Unfortunately, other indicators particularly suited to assessing the effectiveness of primary care are not available for international comparisons. These indicators include such health outcomes as: accomplishments in prevention not related only to specific diseases, e.g. physical activity; unwanted pregnancies; early detection of risk of child abuse; low incidence of attempted suicide; low incidence of accidental poisoning; decreased disability from asthma; osteoarthritis; postmyocardial infarct; shortened duration of symptoms from peptic

ulcer; reduced incidence of adverse effects of medications; reduced use of unnecessary laboratory tests and unjustified medications; reduced frequency of stroke, diabetes, amputations, sexually transmitted diseases; improved quality of terminal care; hospitalizations for conditions sensitive to adequate primary care; reductions in disparities across population subgroups (for all indicators).

Neonatal mortality, which is highly influenced by technology applied in the newborn period to increase survival of very low birth weight or ill infants, was not expected to be related to excellence of primary care and, indeed, it did not appear to be.

Several conundrums are posed by the data on some of the countries. Japan's excellent health statistics fly in the face of the existence of at least one major threat to health. The percentage of Japanese males who smoke is much higher (61%) than in the next highest country (47% in Denmark) and more than twice as high as in Sweden and Canada (26%). There is anecdotal evidence that Japanese diets and levels of physical activity are more conducive to health than in western countries, but there is little statistical confirmation of this observation. Although there is no designated type of primary care physician in Japan, physicians in office-based practice often do not limit their practice to the specialty in which they were trained. The actual extent of long-term relationships between people and their doctor may be greater than it appears [13]. As Japan has excellent population-based data (from claims data) of the extent to which people stay with one physician or move from one to another and on the range of problems addressed by individual practitioners, this could be studied, but such a study has not yet been done.

Denmark's poor performance on health indicators, despite a relatively high level of primary care and access to health services, has been a matter of concern. The data on income inequality put it at the fourth or eighth ranking (depending on the measure used) of the 13 countries, and, along with United Kingdom, Sweden, Australia, and United States, Denmark experienced increasing income disparities between 1980 and the early 1990s [14]. However, the extent to which changing income distribution is responsible for subsequent ill health in cohorts of individuals is unknown. A wide range of diseases contributed to the slower improvement in life expectancy in Denmark [15], but it has mainly been associated with poor progress with respiratory cancers, cirrhosis, and cardiovascular diseases and, to a lesser extent, breast cancer, accidents, and suicides. Smoking rates are high, with rates in females (41%) higher by far than in The Netherlands (33%) and double that in most of the other countries. One analysis indicated that the Danish government has avoided regulatory approaches such as controls on access to alcohol and tobacco that are used in other parts of Scandinavia, relying primarily on health education and taxation [15].

The relatively poor position of United Kingdom was also noted in the earlier study, which postulated that the relatively low proportion contributed by central government expenditures for both social welfare and education (but NOT for health services) made the country unique among the European countries and

perhaps were part of the explanation for poorer health than would be expected considering its excellent primary care infrastructure [16]. Added to that now is the observation that United Kingdom is among the most inequitable of the countries in terms of its income distribution.

France, like Japan, has relatively good health statistics despite its relatively poor primary care system. Part of the explanation may be its Mediterranean diet (at least in the southern parts of the country). Although the consumption of animal fats and mean serum cholesterol increased considerably between 1965 and 1988 in Japan, and in France to a considerably lesser extent (but to a level still double that of Japan), the lag time between increases in mortality from ischemic heart disease after an increase in serum cholesterol is thought to be at least 25 years, so that the effect on mortality rates may still be in the future [17]. Notably, in contrast, a decline in cardiovascular mortality occurs much more rapidly with decreases in serum cholesterol [17], such as occurred in Australia, Sweden, United States, Great Britain, and Finland during the same time period.

As noted above, many health indicators used in this study are not ones that would be thought to be most sensitive to primary care. Other analyses that disaggregate mortality data into specific causes find that mortality from conditions thought to be particularly amenable to primary care interventions [4] is lower in areas better endowed with primary care resources [9,18]. Other indicators may be heavily influenced by the seeking and receipt of care from specialists and, therefore, by health system characteristics that influence the likelihood of referrals from primary care. Virtually all countries have been undergoing reform to a greater or lesser degree, mostly as a result of cost pressures on governmental budgets leading to reduced access to specialists, but this may be negated in other countries (such as United States), where many consumers have come to prefer free access to specialists.

In the context of reform, it may be instructive to focus on those aspects of health systems that are especially related to better outcomes. This study suggests that some may be highly salient. The largest differences in average health levels are found between the countries in the poorest primary care group and those in the middle primary care group. Only low birthweight and postneonatal mortality show large differences between the middle group of countries and the highly primary care oriented countries. Of the 15 characteristics that comprised the primary care scores (Appendix A), three system characteristics and two practice characteristics distinguished the low group from the other two groups. The three system characteristics were attempts at equitable distribution of resources throughout the country, government-provided universal health insurance, and absence of or low cost-sharing for primary care. Comprehensiveness of primary care services and family centeredness of primary care were the two practice characteristics that distinguished the better primary care systems from the worst group. Efforts at reform with the aim of improving health status might profitably start with these characteristics.

The following observations might serve as the basis for more concerted study of the impact of recent reforms. Denmark's position in the ranking for the health

indicators worsened between the 1980s and 1990s for all of the indicators except neonatal mortality, postneonatal mortality, and low birth weight (which improved relatively); the increase in years of potential life lost in Denmark was limited to females. The same was generally the case (except for postneonatal mortality, which improved relatively) in The Netherlands. Neither country reduced its health care costs relative to the other countries, so that underfinancing is not likely to be an explanation. The relative position of United States worsened for life expectancy at age 1, for years of potential life lost, and for low birth weight, even though its position was very low initially for all indicators (except life expectancy at age 80 years). On the other hand, the position of Australia improved for most of the indicators, and the position of United Kingdom improved primarily for the infant indicators and life expectancy at age 1. Only the former country experienced increased costs relative to the other countries. Most of these countries have resisted the imposition of higher co-payments [19,20] (which have been increasing in United States) so that it is unlikely that decreased access to primary care could account for the worsening position where that occurred, but the effect of other specific reforms (such as the method of paying primary care and specialist physicians), and hence the likelihood of referrals from one to the other, is unknown.

Despite efforts at health care reform in most countries, a strong primary care orientation within health services systems continues to exert a positive effect, particularly for indicators early in life. High cost may be a result of more unnecessary care, particularly as generated by unnecessary specialist care. A possible relationship between excess mortality and very high rates of use of interventionist technology has been suggested by recent analyses [21]. However, chronic underspending may be associated with poor health later in life, when consultation with specialists for patients with greater morbidity may be salutary. The contribution of health policies designed to assure equitable distribution of primary care resources, those designed to reduce financial barriers to primary care and those designed to enhance comprehensiveness and family orientation of services seem, by themselves, to contribute to better health overall. The relative contribution of other health policies, especially those related to facilitation of appropriate use of specialized and technology-oriented care, as well as policies to encourage better primary care/specialty care coordination, remain to be explored.

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Appendix A

Scores for health systems characteristics related to primary care.

Country	System									Total
	1	2	3	4	5	6	7	8	9	
Belgium	0.0	1.0	2.0	1.0	0.6	0.0	0.0	0.0	1.0	5.6
France	0.0	1.0	1.0	2.0	0.0	0.0	0.0	1.0	0.0	5.0
Germany	0.0	1.0	1.0	0.0	0.0	2.0	0.0	1.0	1.0	6.0
United States	0.0	0.0	1.0	1.0	0.0	0.0	0.5	0.5	1.0	4.0
Australia	1.0	2.0	2.0	2.0	0.0	2.0	0.0	0.0	1.0	10.0
Canada	1.0	2.0	1.5	2.0	0.0	2.0	0.0	1.0	2.0	11.5
Japan	1.0	2.0	0.5	0.0	2.0	1.0	0.0	2.0	0.0	8.5
Sweden	2.0	2.0	2.0	0.0	2.0	1.0	0.0	0.0	1.0	10.0
Denmark	2.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	16.0
Finland	2.0	2.0	2.0	1.0	2.0	1.0	1.0	2.0	2.0	15.0
The Netherlands	2.0	1.0	2.0	1.0	0.0	1.0	2.0	2.0	2.0	13.0
Spain	2.0	2.0	1.5	1.0	2.0	2.0	2.0	0.0	0.0	12.5
United Kingdom	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	18.0

System: 1, Type of system; 2, Financing; 3, Type of primary care practitioner; 4, Percent active physicians who are specialists; 5, Professional earnings of primary care physicians relative to specialists; 6, Cost sharing for primary care; 7, Patient list; 8, Requirements for 24 h coverage; 9, Strength of academic departments of family medicine.

Scores for primary care practice characteristics.

Country	Practice						Total
	10	11	12	13	14	15	
Belgium	0.0	0.0	0.0	0.0	0.0	0.0	0.0
France	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany	0.0	0.0	0.0	0.0	0.0	0.0	0.0
United States	1.0	0.0	0.0	0.0	0.5	0.0	1.5
Australia	2.0	1.0	2.0	0.0	2.0	0.0	7.0
Canada	1.0	1.0	2.0	0.5	1.0	0.5	6.0
Japan	1.0	1.0	1.0	1.0	0.0	0.0	4.0
Sweden	0.0	0.0	1.0	0.0	2.0	1.0	4.0
Denmark	2.0	2.0	2.0	1.0	2.0	1.0	10.0
Finland	1.0	1.0	2.0	1.0	0.0	2.0	7.0
The Netherlands	2.0	2.0	2.0	1.0	2.0	1.0	10.0
Spain	2.0	2.0	1.0	0.0	2.0	1.0	8.0
United Kingdom	2.0	2.0	2.0	1.0	2.0	2.0	11.0

Practice 10, First contact; 11, Longitudinality; 12, Comprehensiveness; 13, Co-ordination; 14, Family-centeredness; 15, Community orientation.

Appendix B

Overall primary care score, average costs of care per capita, and various health indicators.

Country	Primary care		Costs of care	Low birth weight (%)	Neonatal mortality	Post-neonatal mortality	Infant mortality	Income distribution
	System	Practice						
Belgium	5.6	0	\$1693	6.50	4.2	4	7	23
France	5	0	\$1978	6.20	3.3	3.5	5	29
Germany	6	0	\$2222	6.10	3.1	2.7	5.3	30
United States	4	1.5	\$3708	7.20	5.3	3.1	8	36.9
Australia	10	7	\$1776	6.30	3.9	2.2	5.7	31.7
Canada	11.5	6	\$2002	6.00	4.2	2.2	6	28.6
Japan	8.5	4	\$1581	7.10	2.3	2	4.3	31.5
Sweden	10	4	\$1405	4.40	3.1	1.7	4	22.2
Denmark	16	10	\$1430	5.20	3.6	1.8	5.5	24
Finland	15	7	\$1389	4.10	3	1.4	4	22.6
The Netherlands	13	10	\$1756	4.90	4.5	1.8	5.2	27.2
Spain	12.5	8	\$1131	5.40	4.6	2.6	5.5	30.6
United Kingdom	18	11	\$1304	7.00	4.1	2.1	6	34.6
Primary care (<i>r</i>)	0.98***	0.98***	−0.61***	−0.38	0.06	−0.74***	−0.27	−0.10
Primary care (<i>r</i> _s)	0.98***	0.95***	−0.63***	−0.4	0.08	−0.69***	−0.08	−0.12

****P* < 0.01.

Country	Years of potential life lost							
	Smoking		All, except suicide		Suicides		All, except external causes	
	Female	Male	Female	Male	Female	Male	Female	Male
Belgium	21.00%	31.00%	3952.80	7020.40	221.3	588	3157.80	4986.40
France	20.00%	38.00%	3296.50	7212.70	231.8	703.5	2557.70	5031.40
Germany	21.50%	36.80%	3494.30	6671.40	141.3	477.9	2994.30	5101.00
United States	24.60%	28.60%	4656.10	8503.90	121.5	523.5	3861.80	5976.00
Australia	23.80%	28.20%	3201.60	5485.10	119.3	535.9	2683.20	3799.20
Canada	26.00%	26.00%	3413.00	5789.10	157.3	601.2	2811.90	3988.70
Japan	13.30%	60.40%	2470.60	4545.80	181.5	476.5	1999.90	3207.60
Sweden	26.60%	25.20%	2875.50	4739.30	223.9	488.3	2315.10	3392.40
Denmark	40.10%	45.90%	4167.30	6373.40	244.7	594.4	3488.90	4728.70
Finland	20.00%	33.00%	2930.10	6228.80	298.2	1208.00	2157.40	3350.90
The Netherlands	30.50%	42.90%	3406.50	5501.80	151.5	324.3	3035.70	4538.40
Spain	21.00%	44.00%	3333.20	7450.50	56.2	216.6	2837.10	5604.10
United Kingdom	28.00%	29.00%	3762.30	5941.10	83.1	346.8	3359.20	4710.80
Primary care (r)	0.53	0.08	-0.09	-0.37	-0.13	-0.08	0.03	-0.27
Primary care (r_s)	0.55	0.14	-0.04	-0.33	-0.1	-0.24	0.17	-0.32

Country	Life expectancy					
	Age 1		Age 15		Age 40	
	Female	Male	Female	Male	Female	Male
Belgium	NA	NA	NA	NA	41.2	35.3
France	81.5	73.3	67.7	59.6	43.2	36.3
Germany	79.0	72.5	65.2	58.7	40.7	35.0
United States	78.8	72.0	65.1	58.3	40.7	35.5
Australia	80.5	74.6	66.7	60.9	42.1	37.2
Canada	80.4	74.3	66.6	60.5	42.5	37.5
Japan	82.6	76.0	68.8	62.3	43.9	37.9
Sweden	80.2	74.9	66.4	61.1	42.4	37.6
Denmark	77.3	72.2	63.5	58.4	39.0	34.6
Finland	79.6	72.2	65.7	58.4	41.3	34.8
The Netherlands	79.8	74.0	65.9	60.3	41.0	35.7
Spain	80.6	73.3	66.9	59.6	42.9	36.7
United Kingdom	78.9	73.6	65.1	59.8	40.6	35.9
Primary care (r)	-0.37	-0.03	-0.39	-0.05	-0.33	-0.12
Primary care (r_s)	-0.34	-0.03	-0.38	-0.03	-0.32	-0.17

Country	Life expectancy			
	Age 65		Age 80	
	Female	Male	Female	Male
Belgium	18.3	14.0	8.1	6.3
France	20.6	16.1	9.0	7.1
Germany	18.3	14.6	7.9	6.4
United States	19.0	15.5	9.0	7.2
Australia	19.7	15.7	8.9	7.0
Canada	20.1	16.2	9.5	7.5
Japan	20.9	16.5	9.5	7.1
Sweden	19.2	15.6	8.7	6.9
Denmark	17.6	14.1	8.1	6.4
Finland	18.6	14.5	7.9	6.4
The Netherlands	18.7	14.4	8.1	6.2
Spain	19.8	15.8	8.5	7.0
United Kingdom	18.4	14.7	8.6	6.7
Primary care (r)	-0.35	-0.31	-0.25	-0.27
Primary care (r_s)	-0.31	-0.26	-0.36	-0.38

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