Postprint Version	1.0
Journal website	http://content.healthaffairs.org/content/32/4/686.long
Pubmed link	http://www.ncbi.nlm.nih.gov/pubmed/23569048
DOI	10.1377/hlthaff.2012.1242

This is a NIVEL certified Post Print, more info at http://www.nivel.eu

Europe's Strong Primary Care Systems Are Linked To Better Population Health But Also To Higher Health Spending.

BY DIONNE S. KRINGOS, WIENKE BOERMA, JOUKE VAN DER ZEE, AND PETER GROENEWEGEN

Dionne S. Kringos (d.s .kringos@amc.uva.nl) is a postdoctoral health systems researcher in the Department of Social Medicine at the Academic Medical Center, University of Amsterdam, in the Netherlands.
Wienke Boerma is a senior researcher at NIVEL, the Netherlands Institute for Health Services Research, in Utrecht.
Jouke van der Zee is a parttime professor in the Department of International Health at Maastricht University, in the Netherlands.
Peter Groenewegen is the director of NIVEL.

ABSTRACT

Strong primary care systems are often viewed as the bedrock of health care systems that provide high-quality care, but the evidence supporting this view is somewhat limited. We analyzed comparative primary care data collected in 2009–10 as part of a European Union– funded project, the Primary Health Care Activity Monitor for Europe.

Our analysis showed that strong primary care was associated with better population health; lower rates of unnecessary hospitalizations; and relatively lower socioeconomic inequality, as measured by an indicator linking education levels to self-rated health. Overall health expenditures were higher in countries with stronger primary care structures, perhaps because maintaining strong primary care structures is costly and promotes developments such as decentralization of services delivery.

Comprehensive primary care was also associated with slower growth in health care spending. More research is needed to explore these associations further, even as the evidence grows that strong primary care in Europe is conducive to reaching important health system goals.

Primary care is the first level of professional care, where people present their health problems and where most therapeutic and preventive health needs can be satisfied.[1]

Strong primary care is believed to contribute to high-performing health care systems, a belief that is supported by evidence to some extent.[1–4] Decision makers have trusted this evidence and invested in primary care reforms, such as the Affordable Care Act in the United States, as well as in numerous charters and statements made by nongovernmental organizations worldwide.[5,6] Several studies that compare primary care internationally and within the United States have provided evidence of the benefits of strong primary care, in terms of better opportunities to control costs, improved quality of care, better population health, and less socioeconomic inequality in health.[1–4] These studies have shown the potential of primary care to improve the health of populations and the performance of health systems, and they suggest directions for further research.

In Europe these studies have evoked an increased interest in the great variation among health systems and the different roles assumed by primary care. The question that we believed needed to be answered was whether results from previous studies about the benefits of strong primary care systems would still be valid using more recent data and more tailor-made measures.

Also, we wondered, could the results be generalizable if many more European countries were considered? In 2009–10, as part of a European Union– funded project, the Primary Health Care Activity Monitor for Europe, we performed a systemic literature review to derive seventyseven indicators. These measured five key dimensions of primary care: structure, access, coordination, continuity, and comprehensiveness.

With this approach, the study aimed to cover the complexity of primary care by addressing it as a multidimensional concept.[7,8] Data on the indicators were collected in thirtyone countries from the international literature, governmental publications, statistical databases, and national expert consultations. To quantify the strength of the five primary care dimensions in a country, the data on each indicator were transformed into a score ranging from 1 (weak) to 3 (strong),[9] inspired by James Macinko and colleagues' approach[3] (see online Appendix 1).[10] We tested the relationship in thirty-one European countries between the strength of the five primary care dimensions, on the one hand, and key health care system performance indicators, on the other hand: health care spending, patient-perceived quality of care, potentially avoidable hospitalizations, and population health and socioeconomic inequality. Specifically, we sought answers to the following questions and tested the associated hypotheses.

First, is health care spending lower, and the increase in spending slower, in countries that have relatively strong primary care, after adjusting for national income? Second, is the patient-perceived quality of nonmedical aspects of primary care lower in countries that have relatively strong primary care? Recently published research seems to indicate that this relationship exists.

Third, are potentially avoidable hospitalizations lower in countries that have relatively strong primary care, after adjustment for disease prevalence and the availability of hospital beds? Fourth, is population health better in countries that have relatively strong primary care, after adjustment for risk factors? Fifth, are socioeconomic inequalities in health smaller in countries that have relatively strong primary care, after adjustment for inequalities in risk factors? After some background information on recent developments in primary care research, we report our findings below.

RECENT RESEARCH ON THE EFFECTS OF PRIMARY CARE

Large and increasing proportions of national incomes are spent on health care. Data from the 1990s show that countries with strong primary care spent less and were better able than other countries to contain rising health care costs.
Ulf Gerdtham and colleagues[11] found that the overall cost of health carewas generally lower in countries where primary care performs a gatekeeper function and patients can thus access secondary care only upon referral by a primary care professional.
Diana Delnoij and colleagues[2] showed that health care systems in which family physicians served as gatekeepers to more specialized care had a lower increase in ambulatory care costs and in the use of outpatient health services but not in total health care costs, compared to health care systems with directly accessible specialist care.[12] From these studies we can infer that the gatekeeping function, usually coupled with patients' being registered with a primary care doctor, seems to be a key element leading to lower health spending. However, patients do not express equal satisfaction with all aspects of primary care when gatekeeping is present.
Madelon Kroneman and colleagues[13] showed that patients in countries with a gatekeeping system were less satisfied with the quality of nonmedical aspects of primary care, such as convenience in obtaining an appointment or wait times in the office before seeing the doctor, than patients in countries with directly accessible specialists.
However, differences in satisfaction with nonmedical aspects of access were not related to patients' ratings of the quality of the actual care received, such as quick relief of symptoms.
Other studies—mainly from the United States, where gatekeeping has limited implementation— revealed other problems with access to primary care. These studies confirmed that limited availability of primary care in the United States increased avoidable hospitalizations.[14–16] A hospital admission is potentially avoidable when it could have been prevented by effective or accessible primary care.[17] Hospitalization of so-called ambulatory care–sensitive conditions, such as asthma and chronic obstructive pulmonary disease, are particularly avoidable if well managed in primary care.
Positive associations between the accessibility of primary care and better population health have been identified in literature reviews.[18–20] Studies, mostly undertaken in the United States, have shown that regions with a higher primary care physician density, but not a higher specialist density, have a healthier population than regions with a higher specialist and lower primary care physician density as measured by total and cause-specific mortality, low birthweight, and self-reported health.[18–20]
Little evidence is available of a relationship between socioeconomic inequality in health and the strength of primary care. Several US studies suggest that access to primary care can reduce socioeconomic and racial inequalities in health.[20,21]
However, this result has not yet been clearly confirmed in international studies.[22,23]

STUDY DATA AND METHODS

As noted above, we used data gathered in 2009– 10 as part of the Primary Health Care Activity Monitor for Europe.[9] The database covered thirty-one European countries (twenty-seven European Union member states as well as Switzerland, Turkey, Norway, and Iceland).

Depending on the availability of data, some analyses were done for a smallernumber of countries.
Appendix 2[10] contains the descriptive statistics, a list of included countries per variable, and sources of all included variables.

Variables And Confounders

▸HEALTH CARE SPENDING: The total level of health care spending was measured by the total health care expenditure per capita, in US dollar purchasing power parity, in 2009.[24] Its growth was measured over the period 2000–09, as shown in Appendix 3a.[10] The control variables of the wealth and growth in the wealth of a country were measured by gross domestic product per capita in US dollar purchasing power parity in 2009 and changes in gross domestic product during 2000–09.[24]
▸PATIENT-PERCEIVED QUALITY: The patientperceived quality of nonmedical aspects of primary care was measured by the age- and sexstandardized percentage of people who rated the quality of care received from family physicians as very good or fairly good, as opposed to fairly bad or very bad[25] (see Appendix 3b).[10]
▸POTENTIALLY AVOIDABLE HOSPITALIZATIONS: Potentially avoidable hospitalization was measured by age-standardized hospital admission rates per 100,000 population, by sex, for three chronic diseases: asthma, chronic obstructive pulmonary disease (bronchitis and emphysema), and diabetes (short-term complications).
[26] Control variables were the prevalence of diabetes, [27] asthma, and chronic bronchitis/emphysema, [28] age-standardized, by sex and total; and the total number of available hospital beds per 100,000 population.[24]
▸POPULATION HEALTH: Population health was measured by potential years of life lost, by sex, due to diabetes; ischemic heart disease (heart disease characterized by reduced blood flow to the heart muscle, often related to coronary artery disease and hypertension); cerebrovascular disease (stroke); and obstructed airway conditions, including bronchitis, asthma, and emphysema.[26] Potential years of life lost is a summary measure of premature—that is, preventable—deaths that weighs deaths occurring at younger ages more highly than those occurring at later ages, age-standardized per 100,000 population (ages 0–69).
The control variable for diabetes was the percentage of obese or overweight population (body mass index of 25 or higher), by sex and age (ages 15–54 and 55+).[29] The control variable for both ischemic heart disease and cerebrovascular disease was age- and sex-standardized hypertension prevalence.[28] The control variable for chronic asthma, bronchitis, and emphysema was data on the self-reported smoking prevalence in the population ages fifteen and older.[26] More details are available in the online Appendix.[10]
▸SOCIOECONOMIC INEQUALITY IN HEALTH: The level of socioeconomic inequality was measured by the highest attained educational level in having poor or very poor self-perceived health status, asthma, and diabetes, by calculating an age- and sex-standardized Concentration Index for each country.[28] This index quantifies the degree of education-related inequality by condition, ranging from 1 to −1. It indicates that a condition is more concentrated among people with a higher (when positive value) or lower (when negative value) educational background.

[30] Zero points indicates equality; see Appendix 3e.[10] As control variables, the age- and sexstandardized concentration index for obesity[25] (related to diabetes) and daily smoking[27] (related to asthma and self-perceived health) were used.

Independent Variables Data on the strength of primary care were derived from the Primary Health Care Activity Monitor for Europe project database.[9] The following five independent variables were used for the strength of primary care: structure, accessibility, continuity, coordination, and comprehensiveness.

▸STRUCTURE: The first variable indicates how primary care in a country has been structured.

Elements are the existence of primary care policies and regulations—for example, on equal distribution of primary care providers and facilities; the availability of financial resources for primary care; the population's coverage for primary care services; and the development of workforce for primary care—for example, workload, age, and training of family physicians.[7,8] Because these aspects of primary care structure are positively associated with each other, their summation results in one variable indicating the overall strength of a country's primary care structure.[9]

▸ACCESSIBILITY: The remaining variables reflect the strength of important aspects of the primary care services delivery process.[7,8] The accessibility of primary care was measured by the national and geographic supply of primary care services; the way access is organized in primary care practices—for example, the use of appointment systems and the organization of after- hours care; and the affordability and acceptability of services as perceived by patients.

▸CONTINUITY: Continuity of primary care was measured by conditions in place for an enduring doctor-patient relationship—for example, patients' being registered with a primary care doctor; provisions in place to establish informational continuity of care—for example, the use of electronic clinical record systems; and aspects of the quality of the doctor-patient relationship— for example, patient-perceived available consultation time.

▸COORDINATION: Coordination of primary care was measured by the existence of a gatekeeping system, the skill mix of primary care providers, the collaboration within primary care and with secondary care providers, and the integration of certain public health functions in primary care.

▸COMPREHENSIVENESS: The comprehensiveness of primary care was measured by the breadth of services offered to patients at the primary care level—for example, medical technical procedures and certain preventive services.

Appendix 1[10] provides an overview of all indicators used for each of the dimensions.

Dependent Variables

Because these process functions were not strongly associated with each other, four dependent variables were used: primary care access, coordination, continuity, and comprehensiveness of primary care.[8] All five dependent variables were continuous, ranging from 1 (relatively weak) to 3 (relatively strong).

Exhibit 1 provides an overview of the resulting primary care scores by country, using the scoring system shown in Appendix 1.[10]

Statistical Analyses

The association between dependent and independent variables was evaluated in simple (Pearson correlation) and multivariable regression analyses. In the simple linear regression analyses, only one dependent and one independent variable were used. In the multivariable analysis, one control variable was added (to prevent over determination).

Both types of analysis were performed for all hypotheses by using each of the five primary care strength measures as independent variables in separate analyses. We used the software SPSS/ PASW Statistics, version 18.0.

Strengths And Limitations A strength of this study is that it demonstrates the contribution of primary care to the performance of health care systems at a European level. The study has measured the complexity of primary care in diverse health care systems using a comprehensive set of indicators. However, the strength of primary care was measured at one moment in time.

A limitation of the study is that although the best available information was used, the reliability of the sources varied across the thirty-one countries. Also, thirty-one countries is a relatively small number from a statistical point of view. Some analyses could be performed only for even fewer countries, because of limited data availability. The number of included countries ranged from thirty-one countries (for thirteen out of fifty-five variables) to twenty countries (for the diabetes admission rate per 100,000 population). Appendix 2[10] contains a list of included countries per variable. As a result, we were not able to include the impact of potentially important context factors—such as culture, politics, and health care system type—on the dependent variables. It is recommended that future studies take this into account. Another limitation is that some of the data have been collected at the national level, but disaggregated data would have allowed analysis into intracountry variation. This study should be used as a starting point for more in-depth studies on each of the complex outcome areas, preferably by also using microlevel data.

STUDY RESULTS

Strong primary care was associated, respectively, with higher levels of health care spending, but also a reduced rate of growth in health care spending; lower rates of potentially avoidable hospitalization; better population health outcomes; and lower socioeconomic inequality in self-rated health (see Exhibit 2 and Appendices 3 and 4).[10]

Total Health Care Expenditures

Total health care expenditures were higher in countries with a stronger primary care structure after adjustment for national income than in countries with a weaker primary care structure (Exhibit 2). However, countries with more comprehensive primary care services delivery had slower growth in total health care expenditures per capita, also after adjustment for the growth in national income (the rate of change is −0.20; see Appendices 3 and 4).[10] Patient-perceived quality of nonmedical aspects of care and the strength of primary care were not associated with any aspect of strong primary care.

Potentially Avoidable Hospitalizations

Stronger primary care structure is associated with lower hospital admission rates for asthma, for both the total population (reduction rate: −0.45) and males (reduction rate: −0.51).

[TABEL 1]

Countries with more comprehensive primary care also had lower hospital admission rates for asthma compared to countries with less comprehensive primary care, both for the total population and for women (reduction rates: −0.36 and −0.37, respectively). These lower rates were partly caused by the difference in hospital bed supply among countries, since lower admission rates were associated with having fewer hospital beds. Chronic obstructive pulmonary disease admission rates ofmenwere also lower in countries with a stronger coordination of primary care (see Appendices 3 and 4).[10] Countries with better access to primary care were associated with lower hospital admission rates for diabetes, for both the total population (reduction rate: −0.40) and males (reduction rate: −0.46; see Appendices 3 and 4).[10] Population Health Countries with stronger primary care structures were associated with fewer potential deaths due to ischemic heart disease among the total, male, and female populations.

Countries' having more comprehensive primary care was also associated with fewer potential deaths due to ischemic heart disease amongmen(the reductionrate in potential years of life lost was −0.35; see Appendices 3 and 4).[10] Furthermore, the comprehensiveness of primary care was also positively associated with a reduction in potential deaths due to cerebrovascular disease among the total and male populations (reduction rates: −0.42 and −0.43, respectively).

This association was partly caused by variation in the prevalence of hypertension among the respective groups.

[TABLE 2]

However, when one takes into account the prevalence of hypertension, there is a strong association between primary care structure and fewer potential deaths due to cerebrovascular disease among men (reduction rate: −0.36; see Appendices 3 and 4).[10] Both the structure and the coordination of primary care were associated with fewer potential deaths due to chronic asthma, bronchitis, and emphysema. Countries with a stronger structure of primary care were associated with fewer potential deaths among women due to obstructive airway conditions (reduction rate: −0.37). The coordination of primary care was positively associated with fewer potential deaths among the total population and men (reduction rate: −0.43 for both; see Appendices 3 and 4).[10] No association was found between the strength of primary care and potential deaths due to diabetes.

Socioeconomic Inequality

Countries with better continuity of primary care were associated with a significantly lower socioeconomic inequality in self-rated health (the reduction rate in inequality was −0.52).The rate of inequality in poor self-rated health ranged from −0.38 (Spain; less-educated people had worse health) to 0.44 (Malta; more-educated people had worse health). This aspect of primary care—continuity— was the only one with a significant association with socioeconomic inequality in self-rated health (see

Appendices 3 and 4).10 Socioeconomic inequality in the prevalence of asthma or diabetes showed no significant association with the strength of primary care.

DISCUSSION

Health Spending And Primary Care

We had hypothesized that health care expenditures are lower and increase more slowly in countries with relatively strong primary care. This hypothesis was partly proven.

From 2000 to 2009 countries with more comprehensive primary care had a slower increase (rate of change: −0.197) in health care spending than countries with less comprehensive primary care. Although this result is in line with our expectations, other results also showed that countries' stronger primary care structures are associated with increased health spending (rate of change: 0.153). Countries with stronger primary care structures apparently had higher spending as a starting point. It makes sense that when patients can be treated for a broader scope of health problems within primary care, fewer expensive services need to be provided at higher care levels, reducing the overall growth in costs. However, maintaining a strong primary care structure appears to be a cost driver. Building and sustaining strong primary care structures may promote such policy developments as decentralization of services delivery, protection of patients' rights, implementation of proper financial mechanisms, and a sound educational system for primary care professionals.

Further research is recommended to explore the relationship between the strength of primary care and overall health care spending. This research may require the application of more sophisticated methods to calculate overall health care spending.

Patient-Perceived Quality Of Care

We hypothesized that the patient-reported quality of nonmedical aspects in primary care practices is lower in countries with relatively strong primary care—such as the Netherlands, Spain, and Portugal—compared to countries with relatively weak primary care—such as Turkey, Austria, and Luxembourg. This was not confirmed, because primary care strength was not associated with patients' ratings of these quality aspects.

Perhaps when patients are asked about the quality of care they received at their primary care office—the variable used in this study—they associate the term "quality" with medical aspects of care, not nonmedical aspects. If data availability allows it, future research should investigate the relationship between different aspects of perceived quality of care and primary care strength.

Potentially Avoidable Hospitalizations

This study confirmed the positive associations of strong primary care with potentially avoidable hospitalizations found in national studies.[14–16] The results indicate that the structure of primary care, accessibility to primary care, and the coordination and comprehensiveness of primary care are all related to reduced potentially avoidable hospitalizations for conditions that can also be treated within primary care.

This result supports initiatives to strengthen the structure of primary care, such as the implementation of increased payments to primary care providers in Medicare and Medicaid, in the context of the recent Affordable Care Act in the United States.[31] The focusing of primary care policies on these aspects serves both quality improvement

for patients and decreasing unnecessary use of expensive care. However, it should be noted that given the strong relationship between socioeconomic inequality and health, hospitalization rates might be lower and health outcomes might be better in countries with less inequality.
If there is also an inverse relationship between inequality within a country and the strength of its primary care system, failure to control for inequality might lead to an overestimation of the strength of the relationship between avoidable hospitalizations and health on the one hand and strength of primary care on the other.
Because empirical evidence was lacking, inequality was not used here as a control variable.

Population Health

The hypothesis that population health is better in countries with relatively stronger primary care was confirmed.
Both the structure of primary care and the coordination and comprehensiveness of primary care had a positive relationship with the health of people with ischemic heart disease; cerebrovascular disease; and asthma, bronchitis, and emphysema. People suffering from these conditions had better prospects in terms of fewer lost years in health care systems with a strong primary care structure, good coordination of primary care, and comprehensive services delivery.
Only for people with diabetes was such an association not evident.
Because population health is an extremely relevant outcome, this finding is most important. It is in line with earlier results from the United States, such as those found by Macinko and colleagues.[3]

Socioeconomic Inequality

In Health Our hypothesis that countries with relatively strong primary care have lower socioeconomic inequalities in health was partly confirmed. An association was found between the strength of primary care and inequality in self-rated health but not for asthma or diabetes. This association indicates that patients who have a long-term relationship with a primary care provider, have access to good and continuous medical information, and report a satisfactory doctor-patient relationship experience fewer socioeconomic inequalities.
This finding confirms the results of previous studies, showing the disparity reducing effect of primary care.[22] However, we cannot explain why this relationship was not shown for asthma or diabetes.
Various studies have pointed to weaknesses in the primary care system in the United States. For example, the 2009 international health system survey by the Commonwealth Fund showed a lack of coherence in policies on primary care across the nation; this situation may change with the recent introduction of the Affordable Care Act.[32] The combined evidence of previous studies and this study support the efforts of policy makers globally to prioritize primary care strengthening on the health policy agenda; encourage primary care providers by showing the importance of their work for the health of the population; support funding agencies in investing in primary care research; and support researchers in further improving our understanding of the functioning of primary care at macro and micro levels.

CONCLUSION

This study has confirmed that strong primary care in Europe is associated with a positive impact on improving population health, reducing socioeconomic inequalities in health, and avoiding potentially unnecessary hospitalizations.
However, health spending during the 2000s seemed to be higher in countries with relatively stronger primary care provision. This finding requires further investigation. Overall, evidence is growing that strong primary care in Europe is conducive to reaching important health care system goals.

NOTES

1 Starfield B. Is primary care essential? Lancet. 1994;344(8930):1129–33.
2 Delnoij D, Van Merode G, Paulus A, Groenewegen P. Does general practitioner gatekeeping curb health care expenditure? J Health Serv Res Pol. 2000;5(1):22–6.
3 Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970–1998. Health Serv Res. 2003;38(3):831–65.
4 Shi L, Macinko J, Starfield B, Politzer R, Wulu J, Xu J. Primary care, social inequalities, and allcause, heart disease, and cancer mortality in US counties, 1990. Am J Public Health. 2005;95(4):674–80.
5 Sixty-Second World Health Assembly. Primary health care, including health system strengthening. Resolution WHA62.12 [Internet]. Geneva: World Health Organization; 2009 May 22 [cited 2013 Mar 6]. Available from: http:// www.who.int/hrh/resources/ A62_12_EN.pdf
6 World Health Organization. The World Health Report 2008: primary health care now more than ever. Geneva: WHO; 2008.
7 Kringos DS, Boerma WGW, Hutchinson A, van der Zee J, Groenewegen PP. The breadth of primary care: a systematic literature review of its core dimensions. BMC Health Serv Res. 2010;10(1):65–78.
8 Kringos DS, Boerma WGW, Bourgueil Y, Cartier T, Hasvold T, Hutchinson A, et al. The European Primary Care Monitor: structure, process, and outcome indicators. BMC Fam Pract. 2010;11(1):81–98.
9 Kringos DS. The strength of primary care in Europe [dissertation]. Utrecht, the Netherlands: NIVEL/ Utrecht University; 2012.
10 To access the Appendix, click on the Appendix link in the box to the right of the article online.
11 Gerdtham UG, Jönssen B, Macfarlan M, Oxley H. The determinants of health expenditure in the OECD countries: a pooled data analysis. In: Zweifel P, editor. Health, the medical profession, and regulation. New York (NY): Springer US; 1998. p. 113–34.
12 Gress S, Delnoij D, Groenewegen P. Managing primary care behaviour through payment systems and financial incentives. In: Saltman R, Rico A, Boerma WGW, editors.
Primary care in the driver's seat? Organizational reform in European primary care. Buckingham (UK): Open University Press; 2006. p. 184–200.
13 Kroneman MW, Maarse JAM, van der Zee J. Direct access in primary care and patient satisfaction: a European study. Health Pol. 2006; 76(1):72–9.
14 Ansari Z, Barbetti T, Carson NJ, Auckland MJ, Cicuttini F. The Victorian ambulatory care sensitive conditions study: rural and urban perspectives. Soz Praventivmed. 2003;48(1):33–43.
15 Parchman ML, Culler S. Primary care physicians and avoidable hospitalizations. J Fam Pract. 1994;39(2): 123–8.
16 Rosano A, Lauria L, Viola G, Burgio A, De Belvis AG, Ricciardi W, et al. Hospitalization for ambulatory care sensitive conditions and the role of primary care. Ital J Public Health. 2011;8(1):77–88.
17 Caminal J, Starfield B, Sánchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. Eur J Public Health. 2004;14(3):246–51.

18 Friedberg MW, Coltin KL, Pearson SD, Kleinman KP, Zheng J, Singer JA, et al. Does affiliation of physician groups with one another produce higher quality primary care? J Gen Intern Med. 2007;22(10):1385–92.
19 Sans-Corrales M, Pujol-Ribera E, Gene-Badia J, Pasarin-Rua MI, Iglesias-Perez B, Casajuana-Brunet J. Family medicine attributes related to satisfaction, health, and costs. Fam Pract. 2006;23(3):308–16.
20 Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457–502.
21 Chapman JL, Zechel A, Carter YH, Abbott S. Systematic review of recent innovations in service provision to improve access to primary care. Br J Gen Pract. 2004;54(502):374–81.
22 Starfield B. State of the art in research on equity in health. J Health Polit Policy Law. 2006;31(1):11–32.
23 Van Doorslaer E, Masseria C, Koolman X. Inequalities in access to medical care by income in developed countries. Can Med Assoc J. 2006;174(2):177–83.
24 World Health Organization. European Health for All database [Internet]. Geneva: WHO Regional Office for Europe; c2013 [cited 2013 Mar 6]. Available from: http:// data.euro.who.int/hfadb/ 25 TNS Opinion and Social. Special Eurobarometer 283: health and long-term care in the European Union, wave 67.3 [CD-ROM]. Brussels: European Commission; 2007.
26 Organization for Economic Cooperation and Development. OECD health data 2011 [Internet]. Paris: OECD; c2012 [cited 2012 Apr 30]. Available for download from: http://stats.oecd.org/index .aspx?DataSetCode=HEALTH_STAT
27 International Diabetes Foundation. IDF diabetes atlas, 5th edition [Internet]. Brussels: IDF; c2011 [cited 2012 Apr 15]. Available from: http://www.idf.org/atlasmap/ atlasmap
28 TNS Opinion and Social. Special Eurobarometer 272e: health in the European Union, wave 66.2 [CDROM]. Brussels: European Commission; 2007.
29 European Commission. Eurostat statistics [Internet]. Luxembourg: EC; c2012 [cited 2012 Apr 4]. Available for download from: http:// epp.eurostat.ec.europa.eu/portal/ page/portal/statistics/search_ database 30 Kakwani NC, Wagstaff A, van Doorslaer E. Socioeconomic inequalities in health: measurement, computation, and statistical inference. J Econom. 1997;77(1):87–104.
31 Davis K, Abrams M, Stremikis K. How the Affordable Care Act will strengthen the nation's primary care foundation. J Gen Intern Med. 2011;26(10):1201–3.
32 Schoen C, Osborn R, Doty MM, Squires D, Peugh J, Applebaum S. A survey of primary care physicians in eleven countries, 2009: perspectives on care, costs, and experiences. Health Aff (Millwood). 2009;28(6): w1171–83. DOI: 10.1377/hlthaff .28.6.w1171.

TABLES

EXHIBIT 1

Strength Of Key Primary Care Aspects In Thirty-One European Countries, 2009–10

Country	Structure	Accessibility	Continuity	Coordination	Comprehensiveness
Austria	2.22	2.27	2.19	1.38	2.33
Belgium	2.21	2.13	2.38	1.70	2.53
Bulgaria	2.14	2.15	2.33	1.44	2.54
Cyprus	1.91	2.11	2.32	1.49	2.19
Czech Rep.	2.14	2.35	2.41	1.64	2.33
Denmark	2.38	2.46	2.43	1.96	2.40
Estonia	2.29	2.21	2.42	1.71	2.41
Finland	2.31	2.20	2.32	1.74	2.51
France	2.16	2.06	2.33	1.63	2.47
Germany	2.20	2.25	2.38	1.38	2.34
Greece	2.10	2.08	2.25	1.96	2.17
Hungary	2.08	2.34	2.33	1.46	2.29
Iceland	1.77	2.28	2.40	1.60	2.42
Ireland	2.20	1.96	2.38	1.57	2.36
Italy	2.33	2.27	2.31	1.73	2.13
Latvia	2.14	2.15	2.38	1.65	2.41
Lithuania	2.27	2.29	2.30	1.98	2.56
Luxembourg	1.90	2.03	2.31	1.63	2.42
Malta	2.12	2.17	2.17	1.82	2.38
Netherlands	2.50	2.38	2.26	2.20	2.32
Norway	2.27	2.25	2.36	1.56	2.55
Poland	2.12	2.35	2.33	1.92	2.29
Portugal	2.41	2.34	2.35	1.62	2.47
Romania	2.31	2.26	2.33	1.55	2.20
Slovak Rep.	2.02	2.27	2.39	1.39	1.98
Slovenia	2.36	2.47	2.30	1.84	2.32
Spain	2.43	2.44	2.43	1.84	2.51
Sweden	2.23	2.17	2.25	2.32	2.49
Switzerland	2.04	2.17	2.37	1.63	2.42
Turkey	2.27	2.05	2.15	1.61	2.36
UK	2.52	2.40	2.37	1.88	2.52

SOURCE Kringos DS. The strength of primary care in Europe (Note 9 in text). **NOTE** Scores range from 1 (weak primary care) to 3 (strong primary care).

Kringos, D.S., Boerma, W., Zee, J. van der, Groenewegen, P. Europe's strong primary care systems are linked to better population health but also to higher health spending. Health Affairs: 2013, 32(4), 686-694

EXHIBIT 2

Correlation Between Selected System Features And Outcomes In European Health Systems

	Structure	Accessibility	Continuity	Coordination	Comprehensiveness
Total health spending, 2009 (USD PPP per capita)[a]	−0.01	−0.01	0.08	0.11	0.22
% change in total health expenditure, 2000–09 (USD PPP per capita)[a]	0.04	0.02	0.12	−0.10	**−0.37**
% pop. rating quality of family doctors as "good," 2007[b]	−0.05	−0.06	−0.04	−0.14	0.04
ADMISSION RATE PER 100,000 POPULATION, 2007–09[c]					
Asthma	−0.23	−0.13	0.05	−0.24	**−0.36**
COPD	−0.15	−0.11	0.13	−0.28	−0.09
Diabetes	−0.01	**−0.40**	−0.11	−0.10	0.25
POTENTIAL YEARS OF LIFE LOST PER 100,000 POPULATION, 2005–09[d]					
Diabetes	0.07	0.16	0.12	−0.09	−0.02
Ischemic heart disease	−0.27	−0.00	0.07	−0.25	**−0.52**
Cerebrovascular disease	−0.21	0.20	0.17	−0.15	**−0.42**
Asthma, bronchitis, and emphysema	−0.23	0.08	0.05	**−0.43**	0.02
CONCENTRATION INDEX, 2006[e]					
Bad (very bad) self-rated health	−0.27	−0.26	**−0.43**	0.05	−0.02
Asthma prevalence	0.11	0.32	0.04	0.01	0.06
Diabetes prevalence	0.05	0.02	0.11	0.12	−0.01

SOURCE Authors' analysis. **NOTES** The exhibit provides the results of the Pearson correlation analysis of study variables. The bold correlation indices are statistically significant ($p < 0.10$). The correlation indices of sex-specific variables can be viewed in Appendix 3 (see Note 10 in text). USD PPP is US dollar purchasing power parity. [a]The analyses included data for all thirty-one participating European countries (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom). [b]The analysis included data for twenty-seven countries, excluding Iceland, Norway, Switzerland, and Turkey (because of lack of data). [c]The analysis for asthma and chronic obstructive pulmonary disease included data for twenty-three countries, excluding Bulgaria, Cyprus, Estonia, Greece, Lithuania, Luxembourg, Romania, and Turkey (lack of data); for diabetes the analyses also excluded France, Hungary, and the Slovak Republic. [d]The analysis for diabetes, ischemic heart disease, and cerebrovascular disease included data for twenty-four countries, excluding Bulgaria, Cyprus, Latvia, Lithuania, Malta, Romania, and Turkey (lack of data). For bronchitis, data covered twenty-three countries, also excluding Switzerland. [e]The analysis included data for twenty-seven countries, excluding Iceland, Norway, Switzerland, and Turkey.