Structure, Process, and Outcome in Health System Improvement

Barbara Starfield, MD, MPH

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Washington, DC
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Revolutions in Medicine, 1900s

Ascendance of single disease and chronic illness focus

Diagnostic challenges/more technology

Single cause (? gene) – magic bullet

All fostered an INDIVIDUAL ORIENTATION in health services.

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Revolutions in Medicine, 2000s

Multiple interacting influences on illness/ health

Disparities in health (inequity)

Illness as morbidity burden, not as disease

Risk factors as diseases

Health as an impossibility (a healthy person is someone without enough tests)

All require a POPULATION ORIENTATION.

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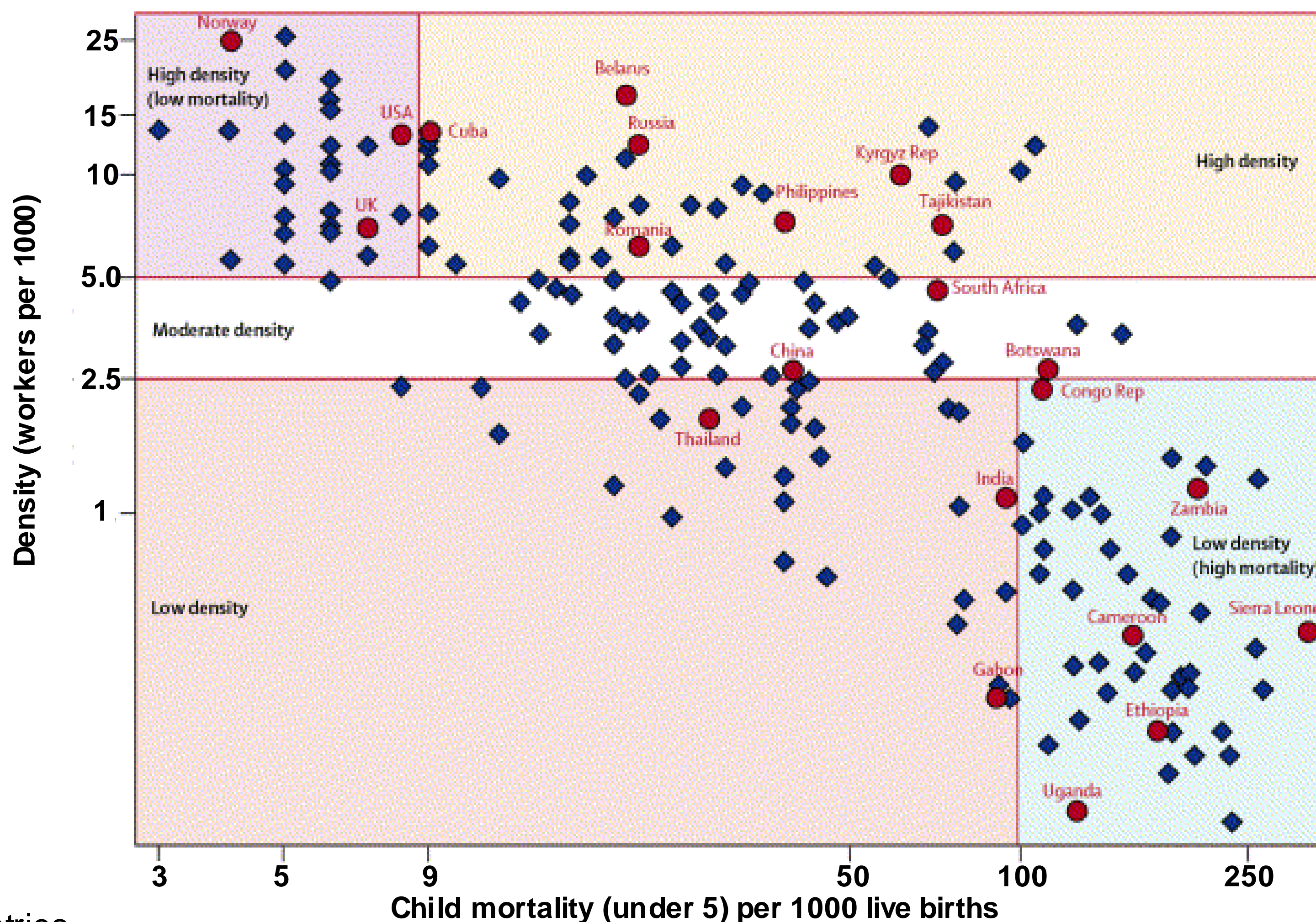
Country* Clusters: Health Professional Supply and Child Survival



*186 countries

Source: Chen et al, Lancet 2004; 364:1984-90.

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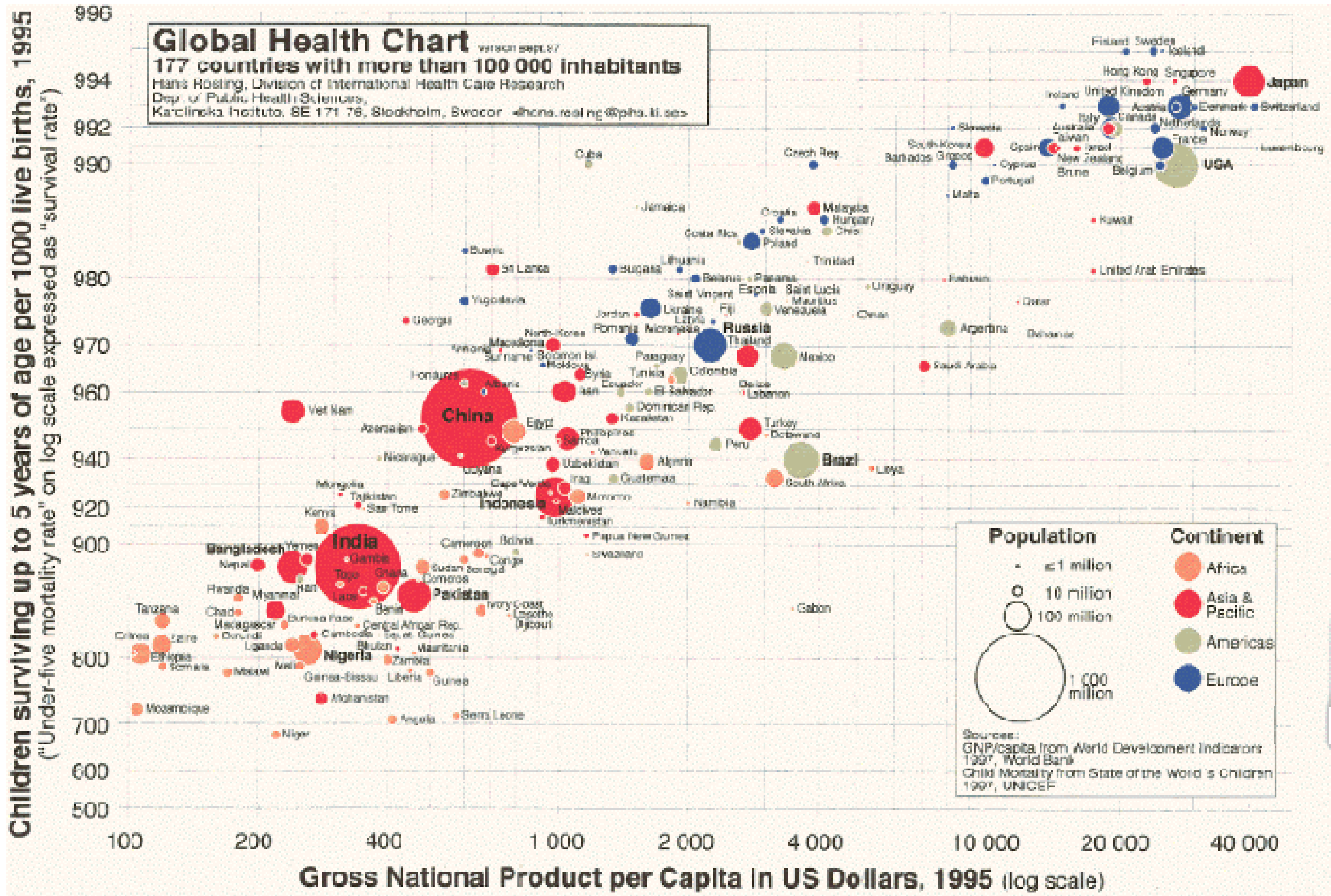

Source: Karolinska Institute: www.whc.ki.se/index.php.

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Life Expectancy Compared with GDP per Capita for Selected Countries

Life expectancy (y)

GDP per capita

85, 80, 75, 70, 65, 60

0, 5000, 10 000, 15 000, 20 000, 25 000, 30 000, 35 000

JA, SW, IT, AU, CN, SZ, US, SP, IS, FR, NE, UK, SI, GE, TW, AG, SK, PO, ME, MA, CH, HU, TK, BZ, RU, SA, IN

Country codes:

AG=Argentina	NE=Netherlands
AU=Australia	PO=Poland
BZ=Brazil	RU=Russia
CH=China	SA=South Africa
CN=Canada	SI=Singapore
FR=France	SK=South Korea
GE=Germany	SP=Spain
HU=Hungary	SW=Sweden
IN=India	SZ=Switzerland
IS=Israel	TK=Turkey
IT=Italy	TW=Taiwan
JA=Japan	UK=United Kingdom
MA=Malaysia	US=United States
ME=Mexico	

Source: Economist Intelligence Unit. Healthcare International. 4th quarter 1999. London, UK: Economist Intelligence Unit, 1999.

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Are there differences in structure, process, and outcomes that can explain variability in health even across areas with similar wealth and resources?

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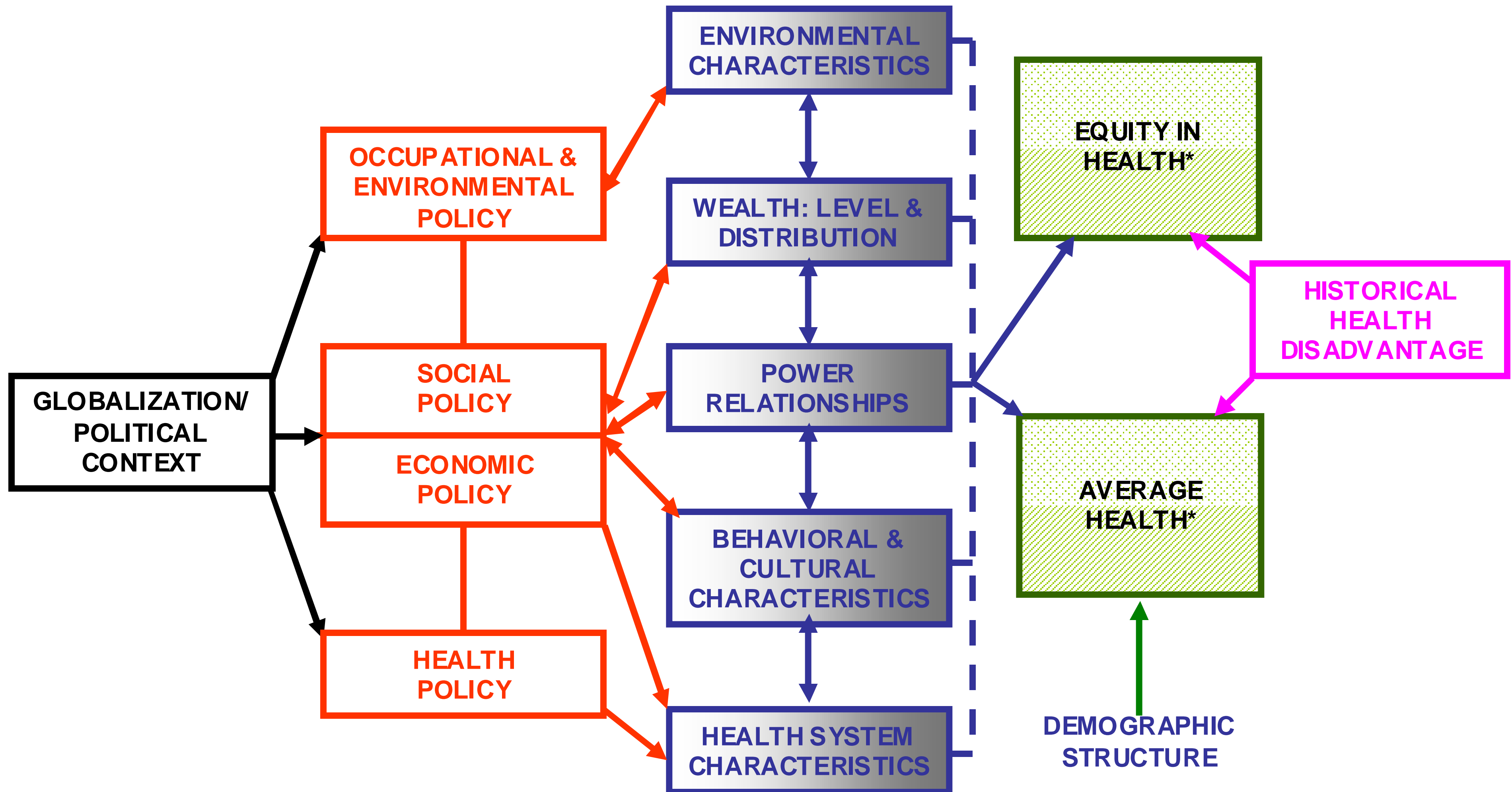
Societal Influences on the Health of Populations



*"Health" has two aspects: occurrence (incidence) and intensity (severity).

Dashed lines indicate the existence of pathways through individual-level characteristics that most proximally influence health.

Shading represents degree to which characteristics are measured at the ecological level (lighter color) or at the individual level aggregated to community.

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A framework based on structure, process, and outcome is helpful in describing and measuring the components of health services systems.

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The Health Services System

CAPACITY

PERFORMANCE

HEALTH STATUS
(outcome)

Provision
of care

Receipt
of care

Personnel
Facilities and equipment
Range of services
Organization
Management and amenities
Continuity/information systems
Accessibility
Financing
Population eligible
Governance

Problem recognition
Diagnosis
Management
Reassessment

People/practitioner interface

Utilization
Acceptance and satisfaction
Understanding
Concordance

Longevity
Comfort
Perceived well-being
Disease
Achievement
Risks
Resilience

Biologic endowment and prior health

Cultural and behavioral characteristics

Social, political, economic, and physical environments

Source: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998.

Starfield 1997
HS 1064

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Primary care is a major component of health services systems.

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Primary Health Care and Primary Care

Primary health care is a system-wide approach to designing health services based on primary care.

Primary care is the representation, on the clinical level, of primary health care.

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The framework of structure, process, and outcome is useful in defining primary care so that it can be measured and evaluated.

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Measuring Primary Care

First Contact	Accessibility Use by people for each new problem
Longitudinality	Relationship between a facility and its population Use by people over time regardless of the type of problem; person-focused character of provider/patient relationship
Comprehensiveness	Broad range of services Recognition of situations where services are needed
Coordination	Mechanism for achieving continuity Recognition of problems that require follow-up

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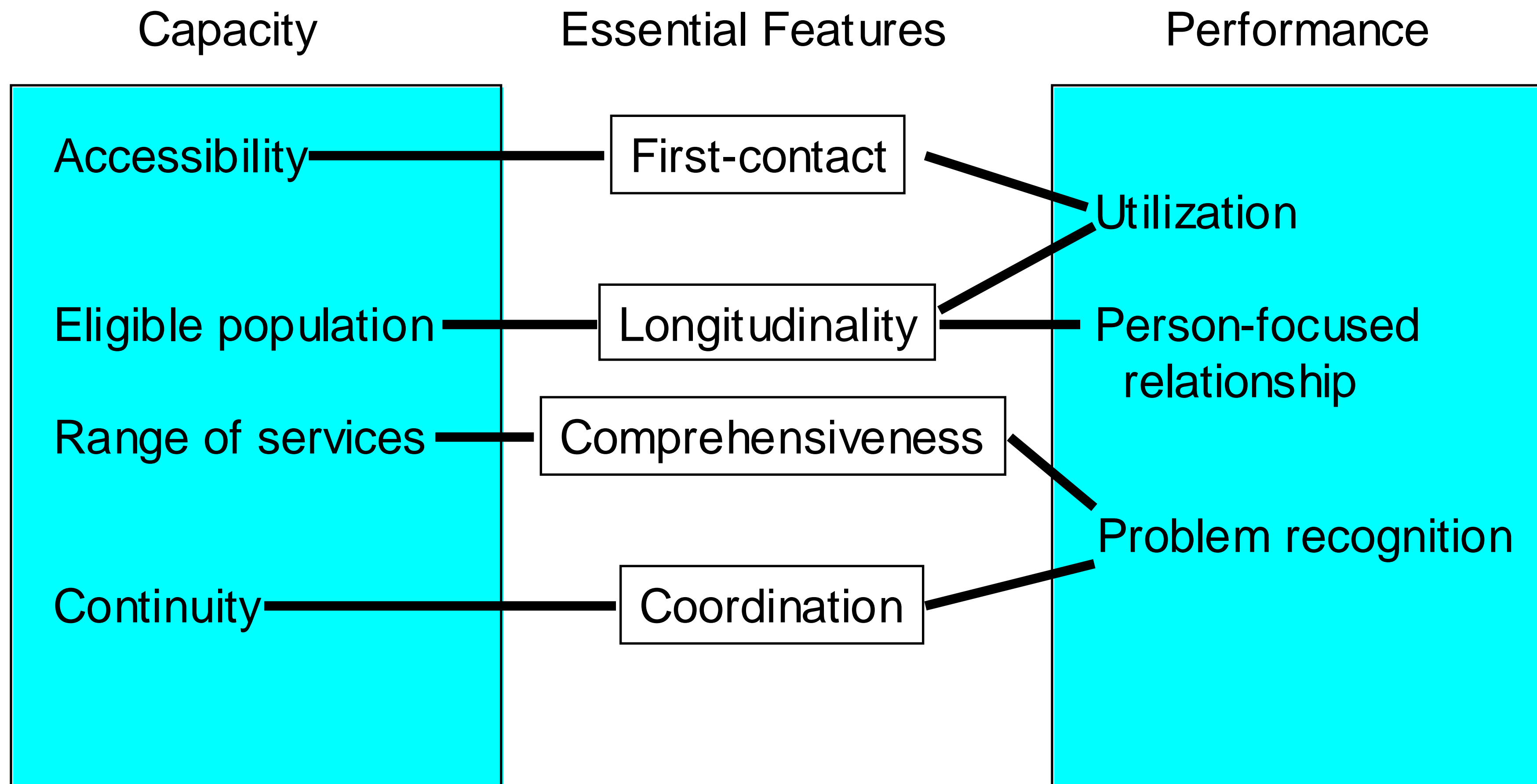
Structural and Process Elements of the Essential Features of Primary Care



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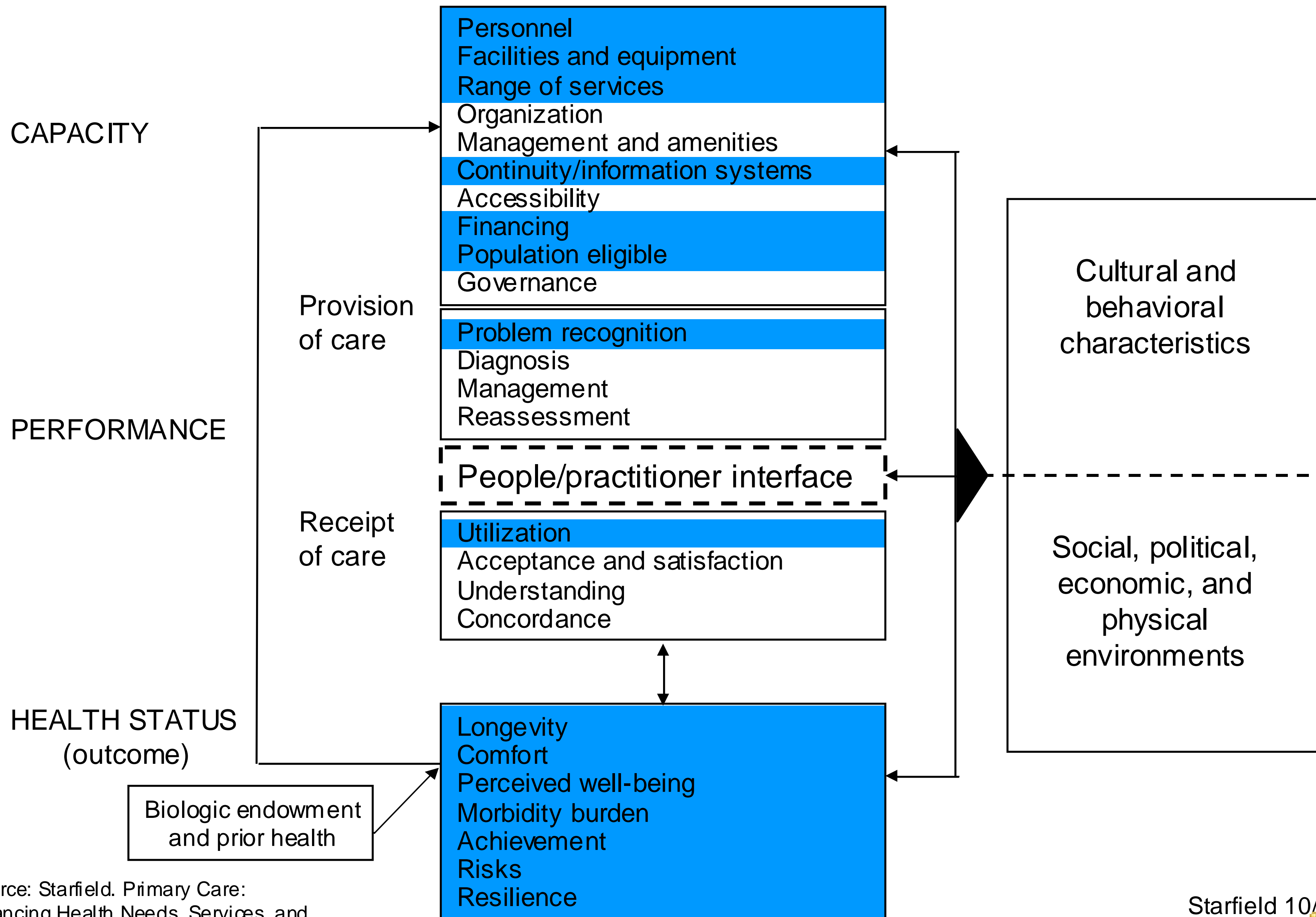
Primary Care Oriented Health Services Systems



Source: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998.

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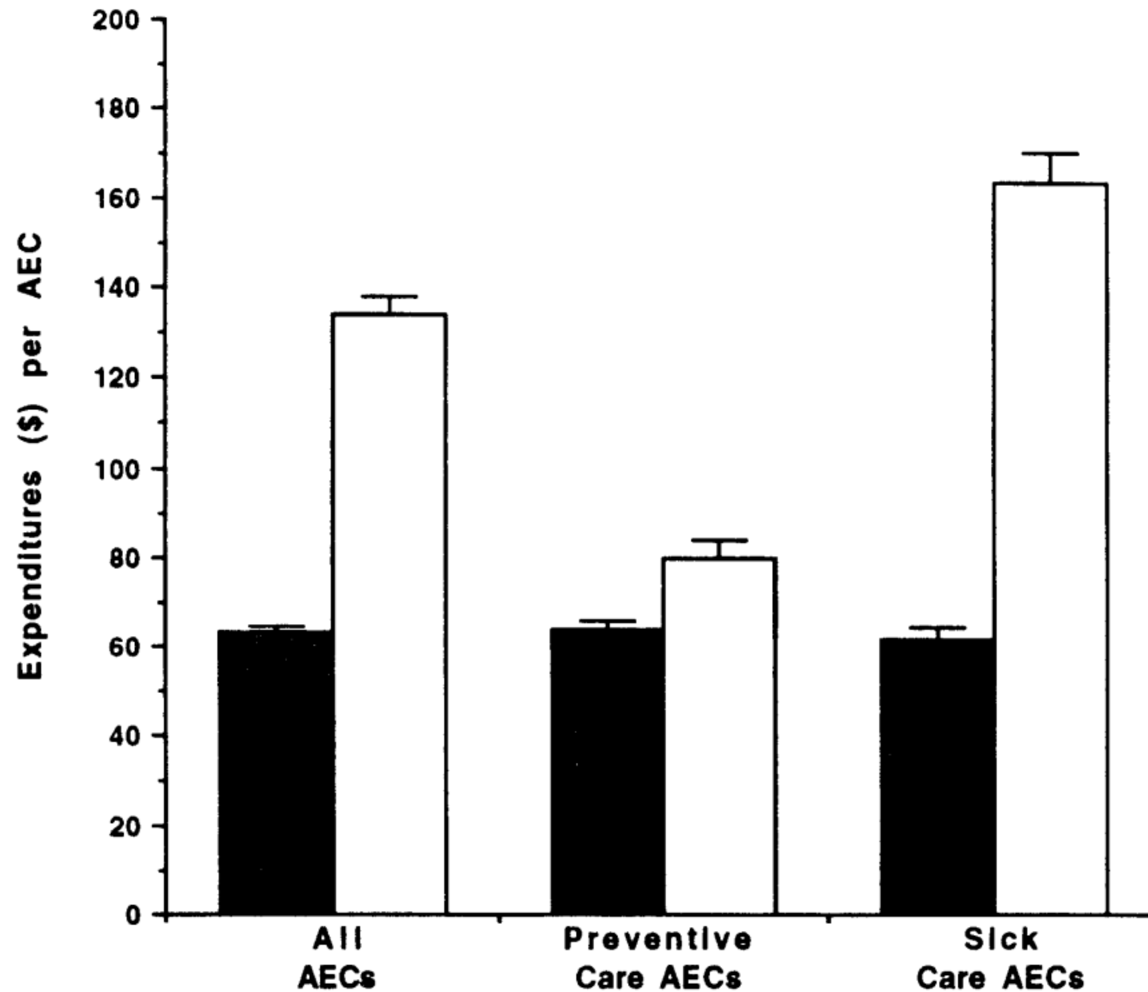
First Contact Care and Health Spending



Based on Forrest & Starfield, J Fam Pract 1996; 43:40-8.

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Benefits of Longitudinality, Based on Evidence from the Literature

	Identification with a Person	Identification with a Place
Better problem/needs recognition	++	
More accurate/earlier diagnosis	++	
Better concordance		
Appointment keeping	++	++
Treatment advice	++	
Less ER use	++	
Fewer hospitalizations	++	+
Lower costs	++	+
Better prevention (some types)	++	++
Better monitoring	+	
Fewer drug prescriptions	+	
Less unmet needs	++	+
Increased satisfaction	++	

++ *Evidence good*
+ *Evidence moderate*

Source: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998.

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Criteria for Comprehensiveness

In US studies: universal provision of extensive and uniform benefits for children, the elderly, women, and other adults; routine OB care; mental health needs addressed; minor surgery; generic preventive care

In European studies: treatment and follow-up of diseases (e.g., hypothyroidism, acute CVA, ulcerative colitis, work-relate stress, n=17); technical procedures (e.g. wart removal, IUD insertion; removal of corneal rusty spot; joint injections); taking cervical smears; group health education; family planning and contraception

PRIMARY CARE ORIENTED COUNTRIES HAVE GREATER COMPREHENSIVENESS (RANGE OF SERVICES).

Sources: Starfield &Shi, Health Policy 2002; 60:201-18; Boerma et al, Br J Gen Pract 1997; 47:481-6; Boerma et al, Soc Sci Med 1998; 47:445-53.

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Coordination

Coordination requires transfer of information (a structural element) and the recognition of that information in the ongoing care of a patient (a process element).

Modes of transfer are multiple: conventional medical records, patient-held records; smart cards; electronic medical records; multidisciplinary teams with specified complementary, supplementary, and substitutive functions of each team member.

These different types have not been compared with regard to effectiveness and efficiency, but developing countries (in particular) are exploring the potential of community workers in assuming explicit responsibility for a variety of primary care tasks in conjunction with personnel in health centers where they exist.

Sources: Starfield, Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998. Brown, Lancet 2007; 370:1115-7.

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There are also structural, process, and outcome features that characterize primary HEALTH care, that is, primary care at the policy level.

At the population level, the critical structural features are equitable distribution of resources (Personnel and Facilities); government control or regulation of financing and low or no copayments for primary care services (Financing); and Definition of the Eligible Population. A remaining question is the extent of importance of mechanisms of Governance, which have been poorly studied.

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Primary Care Scores, 1980s and 1990s

	1980s	1990s
Belgium	0.8	0.4
France*	-	0.3
Germany	0.5	0.4
United States	0.2	0.4
Australia	1.1	1.1
Canada	1.2	1.2
Japan*	-	0.8
Sweden	1.2	0.9
Denmark	1.5	1.7
Finland	1.5	1.5
Netherlands	1.5	1.5
Spain*	-	1.4
United Kingdom	1.7	1.9

*Scores available only for the 1990s

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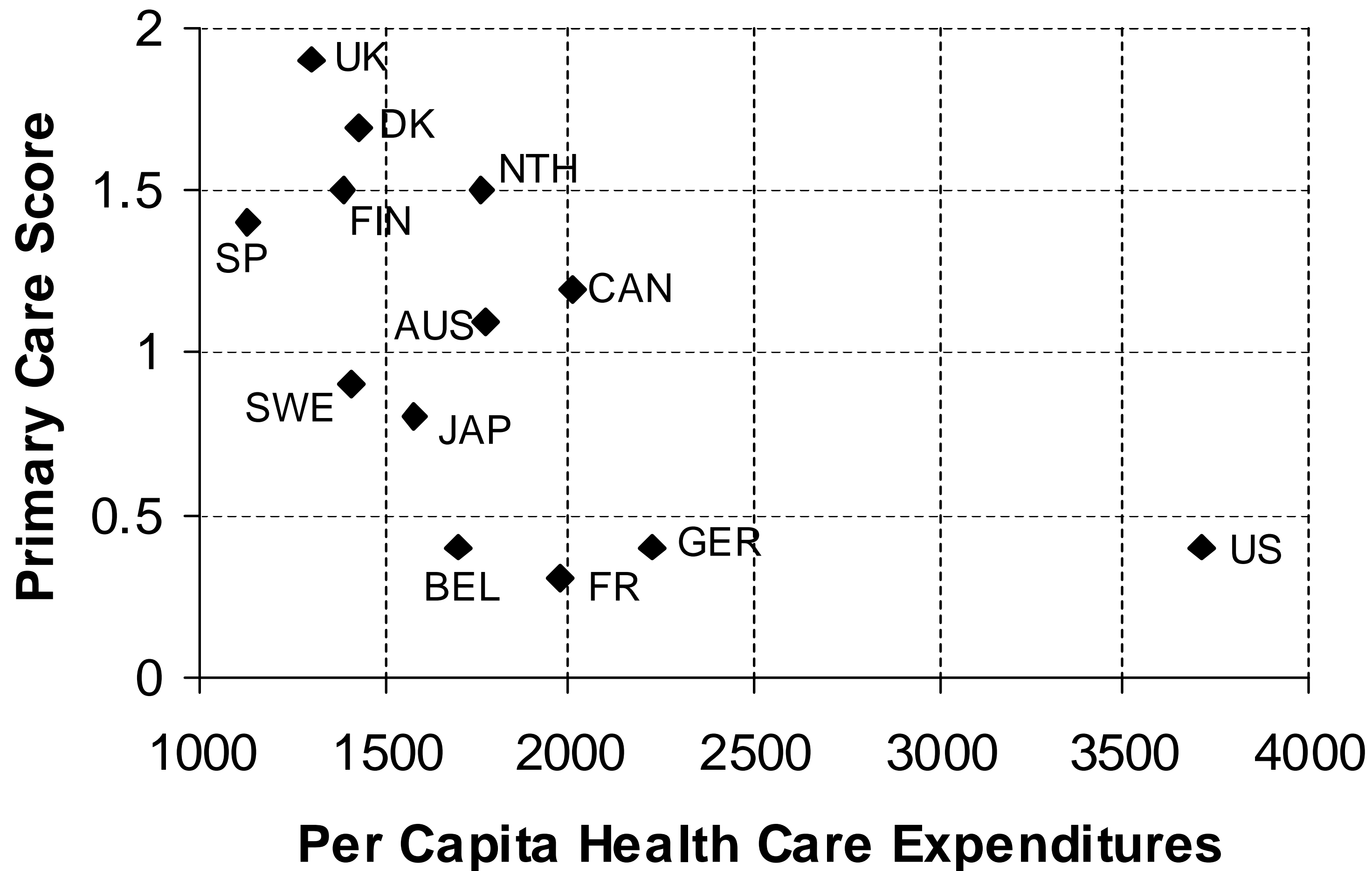
Primary Care Score vs. Health Care Expenditures, 1997



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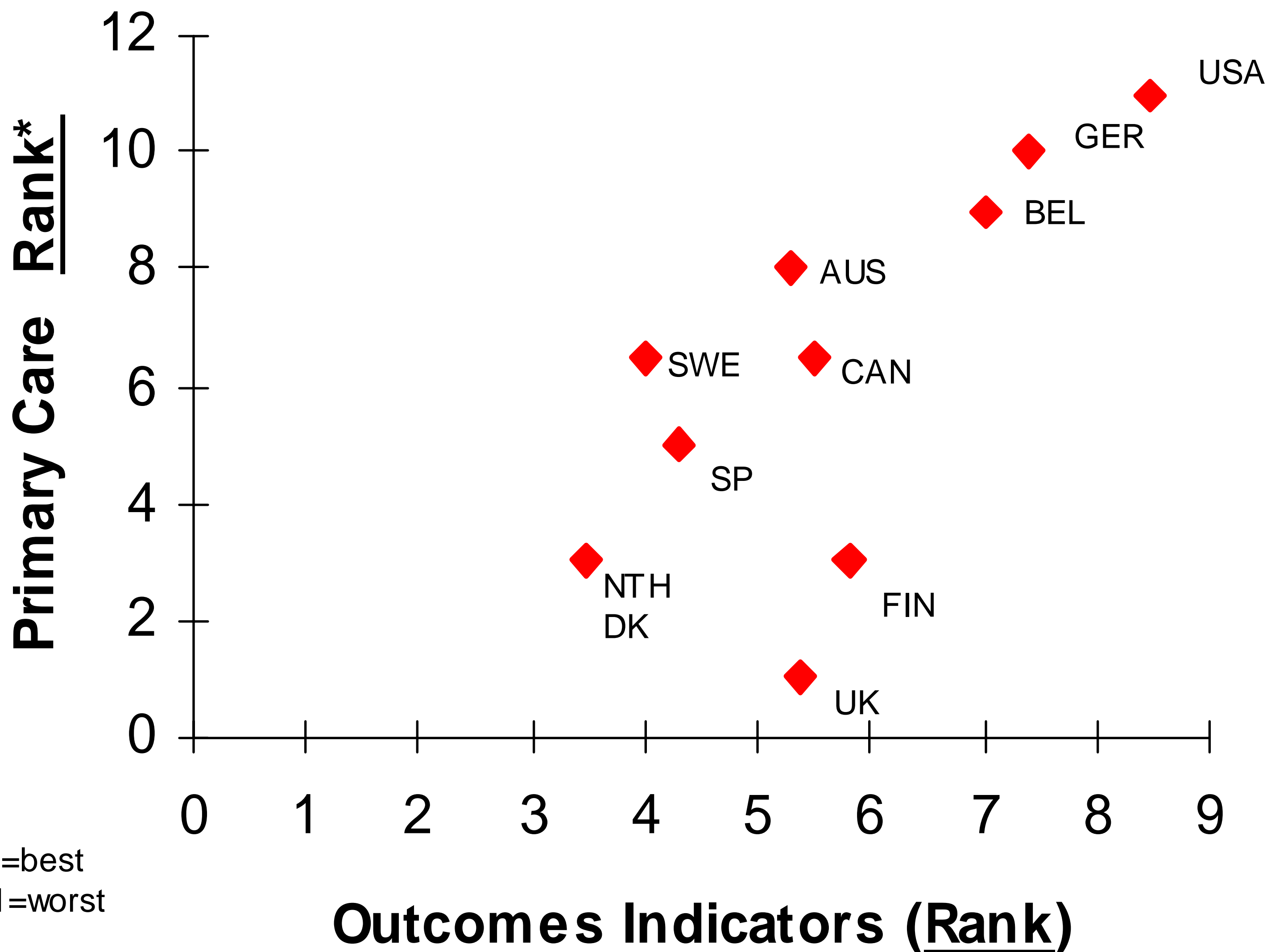
Relationship between Strength of Primary Care and Combined Outcomes



*1=best
11=worst

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System (PHC) and Practice (PC) Characteristics Facilitating Primary Care, Early-Mid 1990s

Practice Characteristics (Rank*)

12 11 10 9 8 7 6 5 4 3 2 1 0

GER BEL FR US SWE JAP CAN FIN AUS SP DK NTH UK

0 1 2 3 4 5 6 7 8 9 10 11 12 13

System Characteristics (Rank*)

*Best level of health indicator is ranked 1; worst is ranked 13; thus, lower average ranks indicate better performance.

Based on data in Starfield & Shi, Health Policy 2002; 60:201-18.

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Primary care oriented countries

- Have more equitable resource distributions
- Have health insurance or services that are provided by the government
- Have little or no private health insurance
- Have no or low co-payments for health services
- Are rated as better by their populations
- Have primary care that includes a wider range of services and is family oriented
- Have better health at lower costs

Sources: Starfield and Shi, Health Policy 2002; 60:201-18.
van Doorslaer et al, Health Econ 2004; 13:629-47.
Schoen et al, Health Aff 2005; W5: 509-25.

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Key factors in achieving an effective health system in both developing and industrialized countries are:

- Universal financial coverage, under governmental control or regulation
- Efforts to distribute resources equitably (according to degree of need)
- No or low co-payments
- Comprehensiveness of services
- Immunization coverage

Sources: Starfield & Shi, Health Policy 2002; 60:201-18.
Gilson et al. Challenging Inequity through Health Systems. Centre for Health Policy, University of Witwatersrand, 2007.

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Studies in other developing and middle income countries also show benefit from primary care reform.

- In Bolivia, reform in deprived areas lowered under-5 mortality rates compared with comparison areas.
- In Costa Rica, primary care reforms in the 1990s decreased infant mortality and increased life expectancy to rates comparable to those in industrialized countries.
- In Mexico, improvements in primary care practices reduced child mortality in socially deprived areas.

Sources: Perry et al, Health Policy Plann 1998; 13:140-51; Reyes et al, Health Policy Plann 1997; 12:214-23; Rosero-Bixby, Rev Panam Salud Publica 2004; 15:94-103; Rosero-Bixby, Soc Sci Med 2004; 58:1271-84.

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Many other studies done WITHIN countries, both industrial and developing, show that areas with better primary care have better health outcomes, including total mortality rates, heart disease mortality rates, and infant mortality, and earlier detection of cancers such as colorectal cancer, breast cancer, uterine/cervical cancer, and melanoma. The opposite is the case for higher specialist supply, which is associated with worse outcomes.

Source: Starfield B. www.pitt.edu/~super1/lecture/lec8841/index.htm

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What We Already Know

A primary care oriented system is important for

- Improving health (improving effectiveness)
- Keeping costs manageable (improving efficiency)

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Does primary care reduce inequity in health?

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Equity in health is the absence of systematic and potentially remediable differences in one or more aspects of health across population groups defined geographically, demographically, or socially.

Source: www.iseqh.org

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In the United States, an increase of 1 primary care doctor is associated with 1.44 fewer deaths per 10,000 population.

The association of primary care with decreased mortality is greater in the African-American population than in the white population.

Source: Shi et al, Soc Sci Med 2005; 61(1):65-75.

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Percentage Reduction in Under-5 Mortality: Thailand, 1990-2000

Poorest quintile (1)	44
(2)	41
(3)	22
(4)	23
Richest quintile (5)	13
Rate ratio (Q1/Q5)	55
Absolute difference (Q1-Q5)	61

Policy changes:

1989 At least one primary care health center for each rural village

1993 Government medical welfare scheme: all children less than 12, elderly, disabled

2001 Entire adult population insured

Activities of Rural Doctors' Society

Source: Vapattanawong et al, Lancet 2007; 369:850-5.

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In 7 African countries

- The highest 1/5 of the population receives well over twice as much financial benefit from overall government health spending (30% vs 12%).
- For primary care, the poor/rich benefit ratio is much lower (23% vs 15%).

"From an equity perspective, the move toward primary care represents a clear step in the right direction."

Source: Gwatkin, Int J Epidemiol 2001; 30:720-3, based on Castro-Leal et al, Bull World Health Organ 2000; 78:66-74.

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Share of Public Spending on Health among Countries with Similar GNP per Capita But Very Disparate Child Survival (to Age 5) Rates, 1995

Ratio*: percent of expenditures for health from the government to poorest 20% vs. richest 20% of population				
High child survival		Low child survival		Additional children lost per 1000
Sri Lanka	1.1	Ivory Coast	0.3	150
Malaysia	2.6	Brazil	0.4	45
Costa Rica	2.1	South Africa	0.9	55
Jamaica	3.3	Ecuador	0.2	25
Nicaragua	1.0	India	0.3	50
Egypt	0.6	Ivory Coast	0.3	100

*Ratios of one or more signify a greater share of government expenditures to poorest segment of population.

Sources: Calculated from Karolinska Institute, Global health chart, www.whc.ki.se/index.php. Victora et al, Lancet 2003; 362:233-241. Castro-Leal et al, Bull World Health Organ 2000; 78:66-74. Carr. Improving the Health of the World's Poorest People. Population Health Bureau, 2004.

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Equity-related System Features (Scores)

	Resource Allocation (Score)	Progressive Financing*	Cost Sharing
Belgium	0	0	0
France	0	0	0
Germany	0	1	2
US	0	0**	0
Australia	1	2	2
Canada	1	2	2
Japan	1	2	1
Sweden	2	2	1
Denmark	2	2	2
Finland	2	2	1
Netherlands	2	0	2
Spain	2	2	2
UK	2	2	2

*0=all regressive
1=mixed
2=all progressive
**except Medicaid

Sources: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998. van Doorslaer et al. Equity in the Finance and Delivery of Health Care: An International Perspective. Oxford U. Press, 1993. Gilson et al. Challenging Inequity through Health Systems. Centre for Health Policy, University of Witwatersrand, 2007.

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Primary Care and Health: Evidence-Based Summary

- Countries with strong primary care
  - have lower overall costs
  - generally have healthier populations
- Within countries
  - areas with higher primary care physician availability (but NOT specialist availability) have healthier populations
  - more primary care physician availability reduces the adverse effects of social inequality

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For outcomes, the imperative is to replace the primary focus on DISEASE with a focus on ILLNESS, substituting a multi-domain conceptualization for a disease-by-disease accounting of health statistics.

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Diseases

- are professional constructs
- can be and are artificially created to suit special interests; the sum of deaths attributed to diseases exceeds the number of deaths
- do not exist in isolation from other diseases and are, therefore, not an independent representation of illness
- are but one manifestation of ill health

Sources: Chin. The AIDS Pandemic: the Collision of Epidemiology with Political Correctness. Radcliffe Publishing, 2007. De Maeseneer et al. Primary Health Care as a Strategy for Achieving Equitable Care: a Literature Review Commissioned by the Health Systems Knowledge Network. WHO Health Systems Knowledge Network, 2007. Available at: http://www.wits.ac.za/chp/kn/De%20Maeseneer%202007%20PHC%20as%20strategy.pdf. Mangin et al, BMJ 2007; 335:285-7. Murray et al, BMJ 2004; 329:1096-1100. Tinetti & Fried, Am J Med 2004; 116:179-85. Walker et al, Lancet 2007; 369:956-63.

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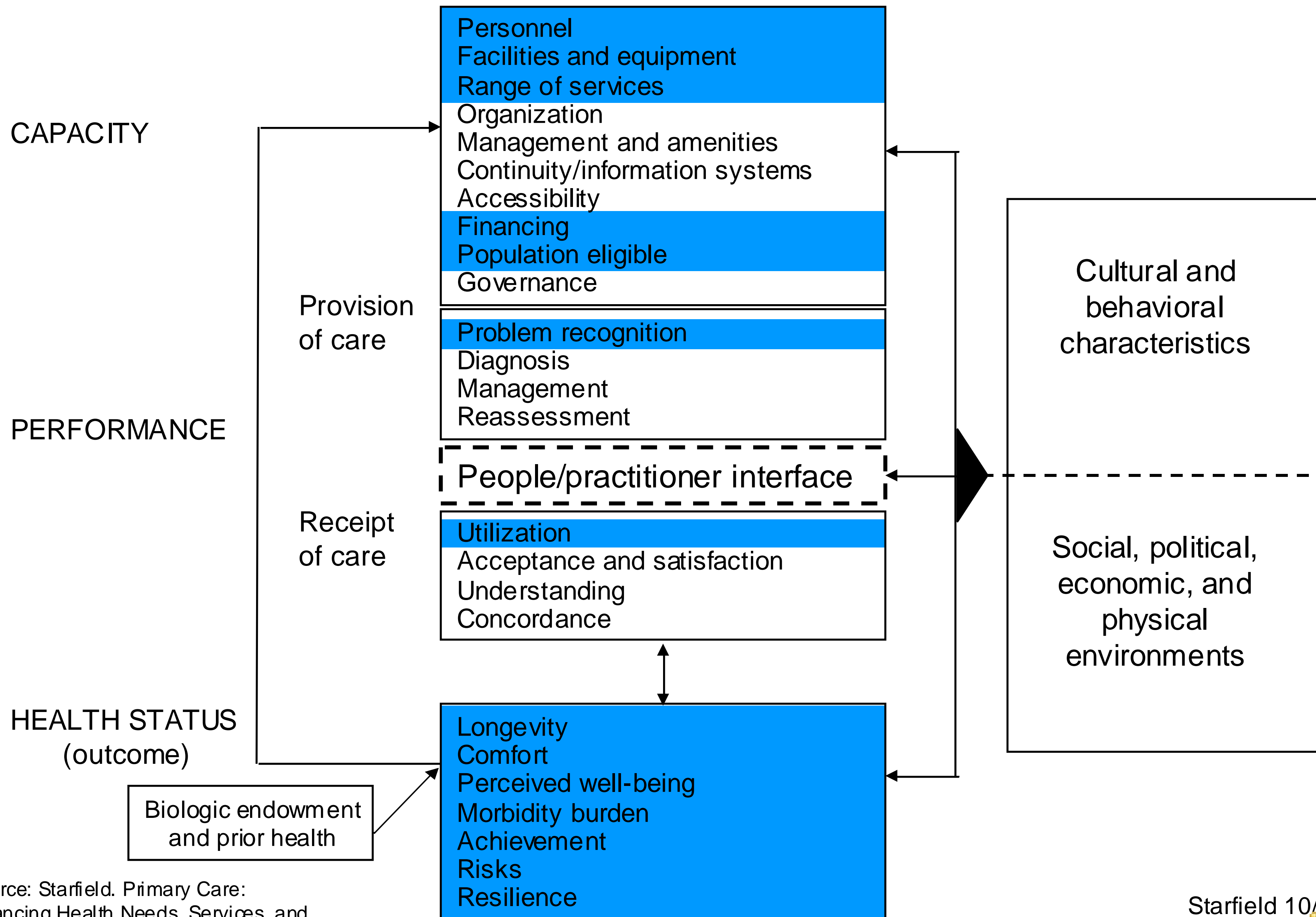

Source: Starfield. Primary Care: Balancing Health Needs, Services, and Technology. Oxford U. Press, 1998.

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