ISO/TC 215 N291

Date: July 2002

N/A

ISO/TC 215/SC /WG 1

Secretariat: ANSI

Health informatics — Health indicators conceptual framework

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

An ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

ISO/TS [number], was prepared by Technical Committee ISO/TC 215, *Health Informatics*, Working Group 1: *Health Records and Modeling Coordination*

Introduction

Heightened interest in the measurement and monitoring of the performance of health care systems, as well as accountability and responsiveness to payors and stakeholders is now evident on an international scale. Consequently, many countries have begun the systematic definition and collection of health information for monitoring health system performance. This trend has also concomitantly driven, and is driven by, an enhanced data infrastructure that allows for more explicit and rigorous examination of the health of populations and their health care systems. More often than not, this has taken the form of the collection of specific health indicators with which to describe a variety of health and health system-related trends and factors.

The term health indicator refers to a single summary measure, most often expressed in quantitative terms, that represents a key dimension of health status, the health care system or related factors. A health indicator must be informative, and also be sensitive to variations over time and across jurisdictions.

In order for them to be useful for monitoring health or health system performance, however, explicit criteria must be applied for choosing and defining health indicators. The selection must be based on some agreement about what is to be measured, and for what purpose, and informed by a clear conceptual framework. This implies a common framework, to be used internationally, for structuring the way we measure health and health system performance. Here, a comprehensive, high-level taxonomy of the key types of indicators that are useful for assessing population health and health services is described.

Working toward a standard health indicators framework will undoubtedly foster a common language for communication between countries, and ultimately, lead to greater commonalities for indicator development. This could, and in fact should, lead to greater potential for generating internationally comparable health data in the long term, in order to permit consistent reporting, dissemination and analysis.

This initiative can also be seen as complementary to work currently underway by other organizations, such as the OECD, for example. The adoption of a common health indicators conceptual framework will further stimulate efforts to develop and collect common health indicators internationally. Furthermore, a harmonized effort to develop an internationally accepted health indicators conceptual framework will not only foster increasingly robust cross-national comparisons and analyses, but may also facilitate the development of comparable data that can be used as a basis for the setting of international bench-marks. The results of such endeavours may be invaluable for informing national health policy related to health expenditures, health human resources requirements or the organization of health and social systems. Ultimately, these developments may facilitate an improved global understanding about variations in health, variations in health care and the effect of other, non-medical determinants of health in the context of other essential factors.

NOTE   See Annex A for more information regarding the OECD initiative and its relationship to this Technical Specification's health indicators conceptual framework.

Health informatics — Health indicators conceptual framework

1 Scope

1.1

This Technical Specification establishes common health indicators conceptual framework, and is intended to foster a common vocabulary and conceptual definitions for the resultant framework.

NOTE 1 Many countries have already developed their own models to direct the collection and analysis of health indicators. For the purposes of national reporting, these existing frameworks are not expected to change. Rather, this framework can be viewed as a compliment to currently existing frameworks. For example, if a particular health indicators framework currently focuses only on health system performance, the comprehensive approach suggested here may serve to augment and/or supplement the currently used model(s).

NOTE 2 Individual jurisdictions may elect to operationalize the conceptual framework differently. Because the conceptual dimensions represent a high-level taxonomy, this provides considerable discretion and leeway in the selection of specific indicators by individual countries. This focus on a high-level taxonomy also allows for sufficient flexibility for the inclusion of new indicators in the future, as new issues emerge and additional data become available. Because specific data elements are not defined, jurisdictions have the freedom to populate this framework with the most relevant, and available, indicators, for their specific situations.

1.2

This Technical Specification does not identify or describe individual indicators or specific data elements for the health indicators conceptual framework. As a next step, it has been proposed that a subsequent work item address the metadata, or the characteristics and common attributes, of actual indicators that might be contained in the health indicators conceptual framework.

NOTE   See Annex B for a brief description of this proposed work item.

1.3

The definition of benchmarks and/or approaches used in the definition of benchmarks is outside the scope of this Technical Specification.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

2.1

health indicator
a single summary measure, most often expressed in quantitative terms, that represents a key dimension of health status, the health care system, or related factors

NOTE: A health indicator must be informative, and also be sensitive to variations over time and across jurisdictions.

2.2

Health Indicators Conceptual Framework
a framework that:

(a) defines the appropriate dimensions and sub-dimensions that are required to describe the health of the population, and the performance of a health care system;

(b) is sufficiently broad (high-level) to accommodate a variety of health care systems; and

(c) is comprehensive, encapsulating all of the factors that are related to health outcomes and health system performance and utilization, and regional and national variations.

NOTE : See Annex C for a more complete discussion of the underlying rationale for this framework.

3 Health Indicators Conceptual Framework

3.1 Framework

The health indicator conceptual framework shall be as outlined in Table 1.

NOTE   See Annex D for background information relating to the framework of Table 1.

Table 1 — Health Indicators Conceptual Framework

Health Status			
Well-being	Health Conditions	Human Function	Deaths
Non-Medical Determinants of Health			
Health Behaviours	Socioeconomic Factors	Social and Community Factors	Environmental Factors	Genetic Factors
Health System Performance			
Acceptability	Accessibility	Appropriateness	Competence
Continuity	Effectiveness	Efficiency	Safety
Community and Health System Characteristics			
	Resources	Population	Health System

Equity

3.2 Framework dimensions

3.2.1 Health Status

The dimension of health status is defined in Table 2. See Annex E for further information.

Table 2 — Health status dimension

Dimension	Definition	Examples of Indicators
Well-being	Broad measures of the physical, mental and social well-being of individuals	• Self-rated health • Self-esteem
Health Conditions	Alterations or attributes of the health status of an individual which may lead to distress, interference with daily activities, or contact with health services; it may be a disease (acute or chronic), disorder, injury or trauma, or reflect other health-related states such as pregnancy, aging, stress, congenital anomaly, or genetic predisposition (WHO)	• Arthritis • Diabetes • Chronic pain • Depression • Food and waterborne diseases • Injury hospitalization
Human Function	Levels of human function are associated with the consequences of disease, disorder, injury and other health conditions. They include body function/structure (impairments), activities (activity limitations, and participation (restrictions in participation). ICIDH-2, beta 2 version)	• Functional health • Disability days • Activity limitation • Health expectancy • Disability free life expectancy
Deaths	A range of age-specific and condition specific mortality rates, as well as derived indicators.	• Infant mortality • Life expectancy • Potential years of life lost • Circulatory deaths • Unintentional injury deaths

3.2.2 Non-medical Determinants of Health

The dimension of non-medical determinants of health is defined in Table 3. See Annex F for further information.

NOTE 1 In order to better understand geographic or temporal variations in health status and health system performance, a variety of non-medical determinants of health have been included in the framework.

NOTE 2 Non-medical determinants of health are those that fall outside of the sphere of medical/health care, generally speaking, but that have been shown to effect health status, and in some cases, access to health care services.

Table 3 — Non-medical determinants of health dimension

Dimension	Definition	Examples of Indicators
Health Behaviours	Aspects of personal behaviour and risk factors that epidemiological studies have shown to influence health status.	• Smoking rate • Physical activity
Socioeconomic Factors	Indicators related to the socioeconomic characteristics of the population, that epidemiological studies have shown to be related to health.	• Unemployment rate • Low income rate • High school graduation •
Social and Community Factors	Measures the prevalence of social and community factors, such as social support, life stress, or social capital that epidemiological studies have shown to be related to health.	• School readiness • Social support • Housing affordability • Literacy
Environmental Factors	Environmental factors with the potential to influence human health.	• Water quality
Genetic Factors	Factors outside those normally influenced by individual behaviours or by the social, economic or physical environment. Genetic factors determine predisposition to certain conditions.	• Rates of genetically determined diseases (e.g. Down's syndrome)

3.2.3 Health System Performance

The dimension of health system performance is defined in Table 4. See Annex G for further information.

Table 4 — Health system performance dimension

Dimension	Definition	Examples of Indicators
Acceptability	All care/services provided meets the expectations of the client, community, providers and paying organizations, recognizing that there may be conflicting, competing interests between stakeholders, and that the needs of the clients/patients are paramount (CCHSA)	• Patient satisfaction (e.g. Australia, UK, US)
Accessibility	The ability of clients/patients to obtain care/service at the right place and the right time, based on respective needs (CCHSA)	• Waiting times (e.g. UK, Australia, US) • Practice availability (UK) • Availability of dentists (US)
Appropriateness	Care/service provided is relevant to the clients'/patients' needs and based on established standards	• Inappropriately used surgery (UK) • Appropriate use of ACEI at discharge for heart failure (US)

Dimension	Definition	Examples of Indicators
	(CCHSA).	5
Competence	An individual's knowledge and skills are appropriate to the care/service being provided (CCHSA).	
Continuity	The ability to provide uninterrupted coordinated care/serivce across programs, practitioners, organizations, and levels of care/service, over time (CCHSA).	
Effectiveness	The care/service, intervention or action achieves the desired results (CCHSA).	• Cancer survival (e.g. UK, Canada, US) • Recurrence of hernia after repair (e.g. Sweden) • Smoking cessation during pregnancy (effectiveness of maternal health care - e.g. Sweden) • Chronic care management: admission rates for asthma, diabetes, epilepsy (UK)
Efficiency	Achieving the desired results with the most cost-effective use of resources (CCHSA).	• Avoidable hospitalizations (e.g. UK, US, Canada) • Cost per casemix-adjusted separation (Australia) • Cost-effective prescribing (UK)
Safety	Potential risks of an intervention or the environment are avoided or minimized (CCHSA).	• Hospital-acquired infection rate (Australia)

3.2.4 Community and Health System Characteristics (Contextual Information)

The dimension of community and health system characteristics contains contextual information which may be useful for the interpretation of indicators, and is defined in Table 5. See Annex H for further information.

Table 5 — Community and health system characteristics

Dimension	Area of Interest		Examples of Indicators
Community and Health System Characteristics	Resources	6	• Number of physicians per capita (e.g. Sweden, Canada) • Provider compensation (US) • Asset ratios • % expenditure on teaching compared to service delivery • % expenditure on research
	Population		• Health Insurance enrolment (US) • % population over 65 years of age • % residing in urban centres
	Health Services		• Number of CAGB per capita • Number of home care services provided per capita

3.2.5 Equity

Equity spans across all dimensions of the framework, and can apply to any of the concepts or indicators contained therein.   See Annex I for a definition.

Annex A
(informative)

Correspondence with OECD Health Indicator Initiatives

Other organizations are also involved in the development of health indicators on an international scale. The OECD (Organisation for Economic Co-operation and Development), for example, has several ongoing initiatives directed at the measurement of health and health system performance. Undoubtedly, many aspects of the current ISO work item overlap with OECD activities. At the same time, it is important to emphasize that in many respects, the proposed ISO Health Indicators Conceptual Framework poses a unique and distinct contribution to this area of inquiry.

The work of this Technical Specification and that of the OECD differ in both focus and scope. The ongoing OECD initiatives tend to concentrate on specific health indicator definitions, data requirements, and data sources, all of which are outside of this proposal. In fact, it has been suggested that the role of the OECD with respect to performance indicators encompass the following elements (Jee and Or, 1999):

- The identification of a common set of health outcome indicators

- Standardization of concepts and data definitions

- Application of these standards in national data infrastructure

- Further analytical work using these data.

On the other hand, the utility of this Technical Specification's health indicators conceptual framework lies in the definition of a taxonomy that is comprehensive and can accommodate present as well as future data availability, yet does not address specific indicators

In order to frame the current definition and collection of OECD performance indicators, the OECD has proposed a performance framework that also corresponds closely to the performance framework developed by WHO (Hurst and Jee-Hughes, 2001). The dimensions included in the proposed OECD framework are presented in Table A.1. It is easily mapped to this Technical Specification's health indicators conceptual framework. Yet while the OECD framework targets selected dimensions, this Technical Specification's framework is broader and more comprehensive in scope.

Table A.A.1 — Mapping to OECD proposed performance framework

Proposed OECD Concept of Performance[1]	Mapping to Proposed ISO Health Indicators Conceptual Framework
Quality (Health improvement/outcomes)	Health System Performance - Effectiveness
Responsiveness	Health System Performance - Access and Acceptability
Efficiency	Health System Performance - Efficiency
Equity	Access; can also be a component of all dimensions

[1] Hurst and Jee-Hughes, 2001.

The OECD has compiled internationally comparable health data for its member countries, focusing on health status and health services inputs and throughputs. Here too, the data included in this compilation corresponds to the health indicators conceptual framework without difficulty (see Table A.2). Again, the objective of *OECD Health Data 2000* is on defining specific data elements and providing data, rather than the development of a single, comprehensive, high-level taxonomy.

Table A.A.2 — Mapping to the OECD health data

OECD Health Data 2000 Main Data Fields	*Mapping to Proposed ISO Health Indicators Conceptual Framework*
Health Status	Health Status
Health Care Resources	Community and Health Care System Characteristics
Health Care Utilization	Community and Health Care System Characteristics
Expenditure on Health	Community and Health Care System Characteristics
Financing and Remuneration	Community and Health Care System Characteristics
Social Protection	Community and Health Care System Characteristics
Pharmaceutical Market	Community and Health Care System Characteristics
Non-Medical Determinants of Health	Non-Medical Determinants of Health
Demographic References	Community and Health Care System Characteristics
Economic References	Community and Health Care System Characteristics

The current OECD initiatives are complementary to the Health Indicators Conceptual Framework within this Technical Specification. While OECD work uses data and health indicators as a starting point and focus, the proposed ISO framework is dedicated to the creation of a framework at a conceptual level, eventually leading to the identification of comparable and relevant data.

Annex B
(informative)

Extension project - Health indicators: Definitions, attributes, and relationships

The development of a standard Health Indicators Conceptual Framework provides the opportunity to be able to characterize indicators in a comparable way. The Framework provides a conceptual model to which indicators can be mapped. In this manner, one can being to define the relationships between various indicators.

However, in order to support true comparability, it is necessary to standardize the metadata that describe the indicators themselves. Indicator metadata are not those data that make up a particular indicator, such as clinical data or survey results, but rather, they are the set of attributes that characterize a particular set of health indicators. These attributes may be classified as indentifying/definitional (e.g., definition or context), relational/representative (e.g., type, formula) or administrative (e.g., source organization) in nature.

An extension project stemming from the Health Indicators Conceptual Framework would then focus on these definitions, attributes and relationships. By developing a standard syntax for describing indicators, and mapping indicators so characterized to a common framework, it would then be possible to create tools to enable the analysis of the comparability and potential usefulness of indicators irrespective of their source.

Annex C
(informative)

Rationale for a Common Health Indicators Conceptual Framework

Why develop a common health indicators conceptual framework?

Data and facts are not like pebbles on a beach, waiting to be picked up and collected. They can only be perceived and measured through an underlying theoretical and conceptual framework, which defines relevant facts, and distinguishes them from background noise" (Wolfson, 1994; p. 309).

It is possible to identify a myriad of potential "health indicators" either in relation to what can easily be generated from available data, or in terms of specific health goals, for example. However, if health indicators are to be useful, either in at a local, national or international level, they must be chosen according to strict criteria rather than in an a priori manner. In order for them to be informative, they must be able to accurately reflect the fundamental elements of the system that we are attempting to measure.

A conceptual health indicator framework can inform the selection and interpretation of meaningful health indicators. Such a framework identifies what information is required to address questions about health and health care, how these pieces fit together and the interrelationships between them.

In the international arena, a single agreed-upon health indicators framework would allow for constant conceptual approach and definitions while allowing a great deal of flexibility in identifying specific indicators and the underlying data requirements. Conceptual frameworks have proven useful as a shared reference point to enable comparable and consistent indicator reporting, and to facilitate communication between countries about health information. Furthermore, this type of framework allows us to understand levels and differences in health and health system performance, and to pinpoint the major factors which should be examined as a requisite to translating this information into health policy. A well-defined conceptual framework will also facilitate a better understanding of which factors or outcomes may be contained within a health care system, and which factors are remediable only through cross-sectoral collaboration.

Annex D
(informative)

Background on the Health Indicators Conceptual Framework

The health indicators conceptual framework specified within this Technical Specification is based on a population health, or determinants of health model. This framework reflects the principle, based on the supporting scientific evidence, that health is determined by a complex interaction of factors, including the social and physical environments, well-being, prosperity, health care, as well as genetic endowment and individual behavioral and biological response[2]. In other words, according to the population health perspective, health is not determined solely by medical care, but by a range of individual and population level cultural, social and economic factors. The implication is that an examination of health and health policies must take account of a broad set of factors including, but not limited to, the provision of health services (Frank 1995).

If, in fact, health indicators are to be used for monitoring the health of the population, *vis à vis* the performance of the health care system, it is essential that we include, or are at least cognizant of, the "other" factors at play. If these are not included spurious conclusions about the relationships between health and health care[3]. Since health care is part of a broader system, where the individual parts are less meaningful than the whole, one cannot attribute changes or patterns for many indicators to the health care system, without first looking at broader factors as well. (Mulligan et al., 2000). Consider the following questions:

- Are differences in access to preventive services, as evidenced by disparities in use of screening mammography, attributable to health care system factors or differences in awareness that may be linked to education?
- Are differences in the prescribing of generic drugs due to differences in providers, underlying morbidity, or differences in insurance coverage in the population?
- Are differences in outcomes following hospital admission for heart attacks due to the variations in treatment or other factors?

In order to address questions such as these, the conceptual health indicator framework includes a broad spectrum of factors for consideration, including:

- The overall health of the population served, and how it compares to other jurisdictions;
- The major non-medical determinants of health in a region;
- The quality of health services received by the region's residents; and
- The characteristics of the community or the health system that provide useful contextual information.

While most frameworks focus on measuring and monitoring of health system performance, and directly or indirectly, various measures of health status, relatively little attention has been paid to other contextual variables that may significantly affect outcomes, inputs, or processes of care (Hearst and Jee-Hughes, 2001). Canada's health indicator framework, on which this framework is based, represents a notable exception, and includes both the more traditional markers of health status and health system performance along with a broad set of non-medical (e.g. social, economic and environmental) determinants (CIHI, 2002) as does Australia's (Nutbeam, 1999).

---

[2] See, for example, Evans and Stoddart (1994) for a detailed discussion of this model.

[3] The postulate that medical care in itself has *not* been the most important source of improved longevity is supported by several authors (e.g. McKeown, 1976; 1978; McKinlay and McKinlay, 1977) who demonstrate that general improvements in the quality of life, rather than health care, have been responsible for reductions in mortality in the twentieth century. While other authors assert that the contribution of health care has not been negligible (Mackenbach, 1993; Szreter, 1998), the assumption that medical care has been the *most* influential determinant of improvements in health cannot be accepted.

It should be recognized that different types of conceptual frameworks may be defined. While some frameworks clearly articulate the underlying causal relationships between various components of the system under consideration, other frameworks are developed solely for the purpose of classifying or categorizing the principle components considered therein. The framework proposed here is clearly a classification framework. Although many of the underlying causal relationships between the dimensions are understood or implied, they are not specifically borne out by this model.

Interrelationships between, and within, the dimensions, however, can and should be considered when using this framework for the specification or interpretation of indicators. As described above, any of the four dimensions may affect any other, such as the effect of non-medical determinants of health on health status, or health system performance. But even within each dimension, significant interrelationships may exist. Consider the factors considered under the dimension of health status, for example. While health conditions, well-being and human function are defined separately in this framework, the manner in which any one of these may be inextricably linked to any other is apparent.

Annex E
(informative)

Health Status

Deaths, or measures of length of life, are perhaps the most widely used and available health status indicators. These include a range of age-specific morality rates, as well as derived indicators such as life expectancy and potential years of life lost.

To fully capture health status, however, one must also strive to include indicators that reflect morbidity or disability on the one hand, and well-being on the other. Two types of health status indicators reflect morbidity and disability: health conditions and human function. Health conditions may include estimates of disease incidence or prevalence, while measures of human function may include indicators such as functional impairment or activity limitations.

The World Health Organization defines health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"[4]. Accordingly, it is important to include measures of well-being in any assessment of health status. Well-being indicators are broad measures of the physical, mental and social well-being of individuals, and may require population-based survey data.

It should be recognized that some conditions considered within this dimensions may in of themselves act as risk factors for other diseases, such as the effect of diabetes on kidney disease.

---

[4] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no.2, p.100) and entered into force on 7 April 1948.

Annex F
(informative)

Non-Medical Determinants of Health

Patterns of health behaviours, or those aspects of personal behaviours or risk factors that epidemiological studies have shown to influence health status, for example, form the first category of non-medical determinants of health. Typically, these may be reflected by factors such as youth smoking, smoking cessation, exercise or breastfeeding, for example.

On the other hand, living and working conditions reflect a broad array of socioeconomic characteristics of the population. The literature on socio-economic status as one of the broad determinants of health lends credence to the supposition that higher social position is associated with better health. Health status, expressed in terms of morbidity or life expectancy, for example, has been shown to vary with income, occupational class, education and other composite measures of socio-economic status. The evidence also suggests that health care utilization is similarly affected by socio-economic status, perhaps independently of health status.

Furthermore, socioeconomic characteristics may also be highly correlated with other non-medical determinants of health. Individual risk behaviours may vary with socio-economic status, and this may be reflected in social inequalities in mortality rates (Brännstrom et al., 1993; Connolly and Kesson, 1996; Droomers et al., 1998; Marmot, Shipley and Rose, 1984; Wickrama et al., 1997; Winkleby et al., 1992). Differences in work characteristics may also contribute to variations in cardiovascular health. The effect of job strain, expressed in terms of demands and control on the job, has been related to coronary morbidity (Bosma et al., 1997; Marmot, Bosma, Hemingway et al., 1997; Everson et al., 1997; Hallqvist et al., 1998; Theorell et al., 1998). Also, unemployment rates have been shown to be related to mortality rates and other health outcomes (Ferrie et al., 1995; Ferrie et al., 1998; Iversen, et al., 1987; Knutsson and Goine, 1998). Although there is limited support for the hypothesis that excess mortality related to employment is the result of job loss due to ill-health, ill-health seems to stem from unemployment rather than *vice versa* (Moser, Fox and Jones, 1984).

Social and community factors form the third category of non-medical determinants included in this framework. On the one hand, social factors such as social support and life stress have been shown to be related to health. The link between social relationships and health is well established (e.g. House, 1988). And combined with other non-medical factors, personal resources may have a profound effect on health. For example, one Canadian study demonstrated that high social relationship scores, together with high income and the absence of smoking, contributed to an 18-fold reduction in mortality over twenty years (Hirdies and Forbes, 1992).

Community health indicators, such as social cohesion or social capital, have recently received increasing attention in the literature. Social cohesion has been shown to be a protective factor in health and mortality. When measured in terms of the social quality of communities, it has been positively associated with perceived health status for women (Molinari, Ahern and Hendryx, 1998). A lack of social cohesion, as reflected in racial segregation, for example, may be related to mortality independently of the socioeconomic characteristics of the area (Fang et al, 1998). Social capital is understood in the context of social and economic resources rooted in the community addressing social interaction, civic engagement, as well as related concepts including educational, recreational or social structures. Social support and social capital has been demonstrated to exert a marked effect on health (Wilkinson et al., 1998), and may be at least as effective in improving health as more traditional individually targeted interventions (Lomas, 1998). Furthermore, social capital may mediate the effects of income, income inequality or poverty on health status (e.g. Cattell, 2001; Kawachi et al, 1997).

Environmental factors refer to the effects of the physical environment that may have a significant effect on health. These may include measures of water, air or soil quality, for example. Measures of environmental risks may be most beneficial where a clear epidemiologic link exists between a specific type of environmental exposure and disease incidence or outcome. At the same time, they may be one of the most difficult to measure in a manner that achieves a representative sample over the landscape.

It may be useful to consider both "controllable", and "non-controllable" environmental factors. Controllable factors might include water or air pollution, for example. Catastrophic, or non-controllable events such as earthquakes, may have a significant short or longer-term effect on health status or any of the factors included in the framework,

and thus should also be taken into account when populating this dimension.

Lastly, genetic factors represent a specific set of individual risk factors that are usually not remediable, and which may manifest as particular genetic diseases. These factors may determine human function, life expectancy and health conditions, although it may be difficult to estimate the contribution of genetic factors to the prevalence of disease and disability. As such, they must be considered in order to form a comprehensive understanding of health and the various pathways which mediate between states of health and illness (Baird, 1994).

Annex G
(informative)

Health System Performance

The third dimension of the health indicator conceptual framework is related to health system performance. Here, factors that are able to capture outcomes, or processes that may be related to outcomes that result from contact with the health care system, are addressed. Nine categories of indicators are considered within the Health System Performance dimension. These are described in greater detail below.

The first two categories within this dimension represent *responsiveness* of the health care system. This categorization refers to responsiveness to the non-medical requirements of the users of health cares systems[5]. On the one hand, acceptability is considered as a key element of responsiveness. Health services are deemed "acceptable" if they meet the expectations of the clients, providers and payors. While in most cases acceptability focuses on the needs and expectations of clients, it should be recognized that these needs might not always be in line with those expressed by other stakeholder groups. Acceptability is frequently measured using patient satisfaction questionnaires.

On the other hand, accessibility represents another facet of responsiveness, and is also receiving increasing attention across the globe. The ability of patients to obtain health care at the right place and the right time, based on their respective needs is becoming a much discussed (and sometimes controversial) topic. Overall patterns of access to health services or wait times for specialized services, such as transplants or heart surgeries may be the outcome of interest. Accessibility is as relevant in countries with universal health insurance as it is in other types of health care systems.

Thirdly, appropriateness of care or service, as defined here, may refer to the appropriateness of the service provided or appropriateness of the setting. In both cases, the appropriate service or setting must be chosen in a manner that provides the best service for the patient. The definition of "appropriate care" must be based on strictly defined criteria, such as those developed by expert panels, the scientific literature or more commonly, a combination of the two (see, for example, Lavis and Anderson 1996).

Competence and continuity are two subdimensions of health system performance that have been defined, but for which specific examples of indicators have yet to be identified. Competence, for example, may be difficult to assess at an aggregate level, but must be considered as a critical determinant of health system performance, particularly outcomes. Similarly, assessing the extent to which continuity between care provided in different health care sectors is ensured may be somewhat elusive from a measurement perspective, but is an increasingly important construct as health care systems are evolve in increasingly complex ways.

Two related concepts, effectiveness, which refers to how well we are doing what we set out to do, and efficiency, which refers to how well we are doing in the context of resources expended, are perhaps the most familiar concepts in performance assessment. Do vaccination programs result in the elimination of certain communicable diseases? Are current cardiac care treatment protocols reducing mortality rates following acute myocardial infarction? Are patients being treated in the least intensive levels of care without evidence of poorer outcomes? Outcome indicators such as these may be defined in relation to the specific clinical objectives (e.g. survival without life support, reduction of morbidity) as well as needs of the clients (e.g. quality of life) (Wilson, 1999).

"Safety" addresses risks to patients that are posed either by the environment in which health services are delivered or the interventions offered (i.e. iatrogenesis and error). Recently, much attention has focused on burden of medical error in Britain (e.g. Fenn et al, 2000) or the United States (e.g. Kohn, Corrigan and Donaldson 1999; Leape, 1999), for example. While health care is certainly not the first industry to discover safety problems,

---

[5] Responsiveness is similarly defined in The *World Health Report 2000. Health Systems: Improving Performance* (WHO, 2000).

changes to improve safety, such as automated physician order entry systems and bar coding, are now just starting to emerge in health care settings. However, safety is not limited to medical error; reducing falls in chronic care facilities, for example, may be of equal concern.

Annex H
(informative)

Community and Health System Characteristics (Contextual indicators)

The final dimension in the health indicators conceptual framework includes those community and health system characteristics that provide useful contextual information, but are not direct measures of either health status, non-medical determinants of health or health system performance. It may be useful to consider these contextual characteristics in the three categories listed in Table 5. First, resources might include financial (health care expenditures), human (number of physicians per capita) or other types of resources (e.g. rated hospital beds per capita). Second, population indicators may alert us to characteristics that may be useful in interpreting the indicator values, such as the age structure or the proportion of the population residing in rural areas. Third, health services indicators may provide additional information on the configuration of the health system (e.g. presence of a teaching hospital or various measures of health services utilization).

The indicators included in this dimension may reflect quantity (e.g. population, number of physicians per capita), distributions (e.g. rural vs. urban populations) or sustainability (of resources, health care system, etc.).

The Community and Health System Characteristics dimension of the Health Indicator Conceptual Framework is distinct from the first three dimensions in several respects. First and foremost, unlike the other dimensions, it is meant to be informative rather than normative. Rather, this dimension is intended to include indicators that may be used to aid interpretation of international differences or trends over time. While virtually any of the other indicators in this framework are characterized by a clear directionality (e.g. higher life expectancy is interpreted as a positive outcome, but lower case-fatality rates following surgical procedures are ascribed a negative interpretation), these contextual indicatos which describe the community and/or health system characteristics may not. On the other hand, while the proportion of population residing in urban areas may be very useful in interpreting other data, in itself one cannot interpret a higher proportion as a more positive result. Also, this dimension may be markedly more country- and context-specific than any of the other three dimensions. As such, the three categories that have been identified for this dimension should be considered as guidelines only.

Annex J
(informative)

Equity

The notion of equity spans all dimensions of the framework, and can apply equally to any construct or dimension. Therefore equity is not included as a fifth dimension of the Health Indicators Conceptual framework, but is presented as a crosscutting element of the framework that applies to each of the four dimensions.

Equity is an integral aspect of health and health care. The World Health Organization identified the attainment of equity in health, both within and between countries, as a primary health goal in the health for all strategy (WHO, 1998). A recent report prepared for the WHO emphasized that inequities in both health status among different groups as well as inequities in the provision of health care services as well as in many related health behaviours and other determinants of health and health care utilization should be considered (Whitehead, 2000). Whitehead (2000, p.7) describes equity in health as "a fair opportunity to attain their full health potential and, more pragmatically, that no one should be disadvantaged from achieving this potential", implying that inequalities stemming from avoidable and/or unfair causes be reduced or eliminated.

Thus while it is essential to measure equity in terms of the "quantity" and "quality" of health (e.g. life expectancy, disability, mortality, etc.), it is equally important to consider equity in health care. For example, is there equitable access to health services, is utilization proportional to need, and is there an equitable distribution of health outcomes, such as those resulting from specific clinical interventions?

Lastly, are the determinants of health, such as risk factors or living conditions, and the characteristics of the health care system or community equitably distributed? Clearly, the concept of equity can potentially apply to, and be measured or estimated for many cells within the conceptual framework, including health outcomes, health behaviours, environmental factors, access, acceptability, effectiveness or resources, among others.

Equity can potentially be measured along any number of dimensions. Most commonly, however, equity is understood as, and is strongly related to, socioeconomic status. The socioeconomic model of equity, as recently described in the Acheson report in the UK (1998), represents such an approach for measuring health inequalities. Other, possibly correlated, dimensions of equity might include gender, age, ethnicity or rural/urban residence, for example.

Annex K
(informative)

Bibliography

Acheson D (1998). *Independent Inquiry into Inequalities in Health Report*. London: The Stationery Office.

Baird, PA (1994). The Role of Genetics in Population Health, in Evans RG, Barer ML, Marmor T (eds). *Why are Some People Healthy and Others Not?* New York: Aldine de Gruyter.

Bosma H, Marmot MG, Hemingway, H, Nicholson AC et al. (1997). Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *British Medical Journal* 314(7080):558-565.

Brännström, I, Weinehall L, Persson LA, Wester PO, Wall S (1993). Changing social patterns of risk factors for cardiovascular disease in a Swedish community intervention program. *International Journal of Epidemiology* 22(5):1026-1036.

Canadian Council on Health Services Accreditation (CCHSA) (1996). *A Guide to the Development and Use of Performance Indicators.* Ottawa: CCHSA.

Canadian Institute for Health Information (CIHI) (2002, forthcoming). *The Health Indicators Project: Concepts and Definitions.* Toronto: CIHI.

Cattell V (2001) Poor people, poor places, and poor health: the mediating role of social networks and social capital. *Social Science & Medicine* (52)10:1501-1516.

Connolly VM, Kesson CM (1996). Socioeconomic status and clustering of cardiovascular disease risk factors in diabetic patients. *Diabetes Care* 19(5):419-422.

Droomers M, Schrijvers CTM, van de Mheen H, Mackenbach JP (1998). Educational differences in leisure-time physical inactivity: a descriptive and explanatory study. *Social Science & Medicine* 47(11):1665-1676.

Evans RG and Stoddart GL (1994). Producing health, consuming health care, in Evans RG, Barer ML, Marmor T (eds). *Why are Some People Healthy and Others Not?* New York: Aldine de Gruyter.

Everson SA, Lynch JW, Chesney MA, Kaplan GA et al., (1997). Interaction of workplace demands and cardiovascular reactivity in progression of carotid atherosclerosis: Population-based study. *British Medical Journal* 314(7080):553-558.

Fenn P; Diacon S; Gray A; Hodges R; Rickman N (2000). Current cost of medical negligence in NHS hospitals: analysis of claims database. *British Medical Journal* 2000 Jun 10;320(7249):1567-71.

Ferrie JE, Shipley MJ, Marmot MG, Stansfeld SA, Davey Smith G (1998). Health effects of anticipation of job change and non-employment: longitudinal data from the Whitehall II study. *British Medical Journal* 311(70150:1264-1269.

Ferrie JE, Shipley MJ, Marmot MG, Stansfeld SA, Davey Smith G (1998). An uncertain future: the health effects of threats to employment security in white-collar men and women. *American Journal of Public Health* 88(7):1030-1036.

Frank JW (1995). Why "Population health"? *Canadian Journal of Public Health* 86(3):162-164.

Hallqvist J, Diderichsen F, Theorell T, Reuterwall C, Ahlbom A and the SHEEP study group (1998). Is the effect of job strain on myocardial infarction risk due to interaction between high psychological demands and low decision latitude? Results from Stockholm Heart Epidemiology Program (SHEEP). *Social Science & Medicine* 46(11):1405-1415.

Hirdes JP, Forbes WF (1992). The importance of social relationships, socioeconomic status and health practices with respect to mortality among health Ontario males. *Journal of Clinical Epidemiology* 45(2):175-182.

House JS, Landis KR, Umberson D (1988). Social relationships and health. *Science* 241:540-544.

Hurst J and Jee-Hughes M (2001). *Performance measurement and performance management in OECD Health Systems*. Labour Market and Social Policy - Occasional Papers no. 47. Paris: OECD.

Iversen L, Andersen O, Andersand PK, Christoffersen K, Keiding N (1987). Unemployment and mortality in Denmark, 1970-1980. *British Medical Journal* 295:879-884.

Jee M and Or Z (1999*). Health outcomes in OECD countries: A framework of health indicators for outcome-oriented policymaking*. OECD Labour Market and Social Policy - Occasional Papers No. 36. Paris: OECD.

Kawachi I, Kennedy B, Lochner K, Prothrow-Stith D (1997). Social capital, income inequality, and mortality. *American Journal of Public Health* 87(9):1491-8.

Knutsson A, Goine H (1998). Occupation and unemployment rates as predictors of long term sickness absence in two Swedish counties. *Social Science & Medicine* 47(1):25-31.

Kohn L., Corrigan J., and Donaldson M., (eds) (1999). *To Err Is Human: Building a Safer Health System Committee on Quality of Health Care in America*, Washington: Institute of Medicine.

Lantz PM, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J (1998). Socioeconomic factors, health behaviours and mortality. Results from a nationally representative prospective study of US adults. *JAMA* 279(21):1703-1708.

Lavis JN and Anderson GM (1996). Appropriateness in health care delivery: Definitions, measurement and policy implications*. Canadian Medical Association Journal* 154(3):321-328.

Leape LL. Reducing errors in medicine. *British Medical Journal* 1999;319:136-137.

Lomas J (1998). Social capital and health: Implications for public health and epidemiology. *Social Science & Medicine*, 47(9):1181-1188.

Mackenbach JP (1993). The contribution of medical care to mortality decline: McKeown revisted. Paper presented at the 11th Honda Foundation Discoveries Symposium, Toronto, October, 1993.

McKeown T (1976). *The Role of Medicine: Dream, Mirage or Nemesis.* London: Nuffield Provincial Hospitals Trust.

McKeown T (1978). Determinants of health. *Human Nature* 1(4):57-62.

McKinlay JB and SM McKinlay (1977). The questionable contribution of medical measures to the decline of mortality in the United States in the twentieth century. *Millbank Memorial Fund Quarterly* Summer, 1977:405-428.

Marmot MG, Bosma H, Hemingway H, Brunner E, Stansfeld S (1997). Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *The Lancet* 350(9073):235-239.

Marmot MG, Shipley MJ, Rose G (1984). Inequalities in death-specific explanations of a general pattern? *Lancet* 1(8384):1003-1106.

Moser KA, Fox AJ, Jones DR (1984). Unemployment and mortality in the OPCS Longitudinal Study. *Lancet* 2(8415):1324-1329.

Mulligan J, Apleby J, Harrison A (2000). Measuring the performance of health systems. *British Medical Journal* 321:191-192.

Nutbeam D (1999). Achieving population health goals: Perspectives on measurement and implementation from Australia. *Canadian Journal of Public Health* 90 (Supplement 1): S43-S46.

Szreter S (1988). The importance of social intervention in Britain's mortality decline c. 1850-1914: a re-interpretation of the role of public health. *Society for the Social History of Medicine* 1(1):1-37.

Theorell T, Tstutsumi A, Hallquist J, Reuterwallet C et al. (1998). Decision latitude, job strain and myocardial infarction: A study of working men in Stockholm. *American Journal of Public Health* 88(3):382-388.

Whitehead M (2000). *The concepts and principles of equity and health.* Copenhagen: World Health Organization Regional Office for Europe.

WHO (1998). *Health for all in the 21st Century.* Geneva: World Health Organization.

WHO (2000). *The World Health Report 2000. Health Systems: Improving Performance.* Geneva: World Health Organization.

Wickrama KAS, Lorenz FO, Conger RD, Matthews L, Elder GH Jr. (1997). Linking occupational conditions to physical health through marital, social and intrapersonal processes. *Journal of Health and Social Behaviour* 38(December):363-375.

Wilkinson R, Kawachi I, Kennedy B (1998). Mortality, the social environment, crime and violence. In: Bartley M, Blane D, Davey Smith G, eds. *Sociology of health inequalities.* Oxford: Blackwell.

Wilson C (1999). *Achieving Quality in Health. Taking Responsibility for Performance.* Toronto: Christopher Wilson Consulting Inc.

Winkleby, MA, Jatulis DE, Frank E, Fortmann SP (1992). Socioeconomic status and health: How education, income and occupation contribute to risk factors for cardiovascular disease. *American Journal of Public Health* 82(6):816-820.

Wolfson M (1994). Social Proprioception: Measurement, data and information from a population health persepctive. In Evans RG, Barer ML, Marmor T (eds). *Why are Some People Healthy and Others Not?* New York: Aldine de Gruyter.