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Health informatics — Health indicators conceptual framework

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National foreword

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Foreword

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ISO 21667 was prepared by Technical Committee ISO/TC 215, *Health informatics*.

This first edition of ISO 21667 cancels and replaces ISO/TS 21667:2004, of which it constitutes a technical revision.

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 must be sensitive to variations over time and across jurisdictions. Indicators are able to flag issues that require more in-depth examination to determine causes for variation, and to identify opportunities for improvement, as well as establishing the most effective use of research resources. They may also be used as a rapid means to evaluate the effects of interventions or to make comparisons as health systems evolve.

In order for them to be useful for monitoring health or health system performance, however, explicit criteria must be applied to choosing and defining health indicators. This framework is intended to inform the selection of health indicators that can be used to monitor and manage the health care system and overall performance improvements. The selection must be based on some agreement about what is to be measured, and for what purpose, and be informed by a clear conceptual framework. This implies a common framework, to be used internationally, for structuring the way health and health system performance is measured. This International Standard describes a comprehensive, high-level taxonomy of the key types of indicators that are useful for assessing population health and health services. While, in many cases, health indicators may be best constructed from readily available data, in other situations a *health indicators conceptual framework* may inform additional data collection initiatives that are required for understanding health and health system performance. It is important to note that any data collection must be carried out according to privacy and confidentiality legislation and ethical principles.

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 ought to lead to greater potential for generating internationally comparable health data in the long term, and so permit consistent reporting, dissemination and analysis.

This initiative can also be seen as complementary to work currently underway in other organizations, such as the Organization for Economic Cooperation and Development (OECD). 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 benchmarks. 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 determinants of health in the context of other essential factors. Furthermore, indicator collection, benchmarking and analysis can lead to continuous quality improvement, the identification of factors requiring further analysis and, ultimately, improvements in health within countries and internationally.

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

INTERNATIONAL STANDARD **ISO 21667:2010(E)**

Health informatics — Health indicators conceptual framework

1 Scope

This International Standard establishes a common health indicators conceptual framework and is intended to foster a common vocabulary and conceptual definitions for the resultant framework. The framework

a) defines the appropriate dimensions and sub-dimensions required to describe the health of the population and 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 related to health outcomes and health system performance and utilization, as well as regional and national variations.

NOTE 1 See Annex B for a more complete discussion of the underlying rationale for this framework.

NOTE 2 Many countries have already developed their own models for directing 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 complement to currently existing frameworks. For example, if a particular health indicators framework currently focuses only on health system performance, the comprehensive approach proposed here can serve to augment and/or supplement the currently used model or models.

NOTE 3 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.

This International Standard does not identify or describe individual indicators or specific data elements for the health indicators conceptual framework; nor does it address needs analysis, demand analysis or the range of activities that need to be supported for health system management.

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

2 Terms and definitions

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

2.1
health
resource for everyday life, not the objective of living, and a positive concept emphasizing social and personal resources, as well as physical capacities

[Ottawa Charter for Health Promotion, World Health Organization (WHO), 1986]

2.2
health indicator
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.

3 Health indicators conceptual framework

3.1 Framework

The health indicators conceptual framework shall be as outlined in Table 1. See Annex C for background information relating to the framework outlined in Table 1.

Table 1 — Health indicators conceptual framework

Dimensions	Sub-dimensions				
Health status	Well-being	Health conditions	Human function	Deaths	
Determinants of health	Health behaviours	Socio-economic 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 characteristics		

3.2 Framework dimensions

3.2.1 Health status

The dimension of health status is described in Table 2. See Annex D for further information.

Table 2 — Health status dimension

Sub-dimensions	Description	Examples of indicators
Well-being	Broad measures of the physical, mental and social well-being	— Self-rated health — Self-esteem
Health conditions	Alterations or attributes of health status 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, ageing, stress, congenital anomaly, or genetic predisposition [50]	Prevalence of: — 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) [50]	— 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 Determinants of health

The dimension of determinants of health is described in Table 3. See Annex E for further information.

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

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

Table 3 — Determinants of health dimension

Sub-dimensions	Description	Examples of indicators
Health behaviours	Aspects of personal behaviour, and risk factors and protective factors that epidemiological studies have shown to influence health status	— Smoking rate — Physical activity
Socio-economic factors	Indicators related to the socio-economic 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 described in Table 4. See Annex F for further information.

Table 4 — Health system performance dimension

Sub-dimensions	Description	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 [6]	— Patient satisfaction
Accessibility	The ability of clients/patients to obtain care/service at the right place and the right time, based on respective needs [6]	— Surgical waiting times — Availability of physicians — Availability of dentists — Time to appointment
Appropriateness	Care/service provided is relevant to the clients'/patients' needs and based on established standards [6]	— Inappropriately used surgery — Appropriate use of ACE inhibitors at discharge for heart failure
Competence	An individual's knowledge and skills are appropriate to the care/service being provided [6]	— Proportion of physicians adhering to accepted clinical guidelines — Proportion of physicians attending regular continuing medical education — Medical error due to incorrect practices
Continuity	The ability to provide uninterrupted coordinated care/service across programmes, practitioners, organizations, and levels of care/service over time [6]	— Patient experiences with duplicate medical tests — Continuity of medication between providers
Effectiveness	The care/service, intervention or action achieves the desired results [6]	— Cancer survival — Recurrence of hernia after repair — Smoking cessation during pregnancy (effectiveness of maternal health care) — Chronic care management: admission rates for asthma, diabetes, epilepsy
Efficiency	Achieving the desired results with the most cost-effective use of resources [6]	— Avoidable hospitalizations — Cost-per-case mix-adjusted separation — Cost-effective prescribing
Safety	Potential risks of an intervention or the environment are avoided or minimized [6]	— Hospital-acquired infection rate — In-hospital hip fracture rate — Wrong-site surgery — Medication errors

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 described in Table 5. See Annex G for further information.

Table 5 — Community and health system characteristics

Sub-dimensions	Description	Examples of indicators
Resources	Contextual information about financial, physical, human or other types of resources	— Number of physicians per capita (number of physicians to population ratio) — Provider compensation — Asset ratios — % expenditure on teaching compared to service delivery — % expenditure on research
Population	Contextual information about the characteristics of the population	— % population over 65 years of age — % residing in urban centres
Health system characteristics	Contextual information about the configuration, organization, sustainability or utilization of the health care system	— Health insurance enrolment — Number of diagnostic imaging procedures performed per capita — Number of home care services utilized per capita — Ratio of fee-for-service physicians to salaried physicians

3.2.5 Equity

Equity spans all dimensions of the framework and can apply to any of the concepts or indicators contained therein. See Annex H for a description.

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 (Organization 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 this International Standard overlap with OECD activities. At the same time, it is important to emphasize that in many respects, this health indicators conceptual framework offers a unique and distinct contribution to indicator frameworks used internationally.

The work of this International Standard 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 the scope of this International Standard. In fact, it has been suggested that the role of the OECD with respect to performance indicators encompass the following elements: [22]

— 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 the present health indicators conceptual framework lies in the definition of a taxonomy that is comprehensive and that 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 the WHO (World Health Organization) (see Reference [21]). The dimensions included in the proposed OECD framework are presented in Table A.1. They are easily mapped to this International Standard's health indicators conceptual framework. Yet, while the OECD framework targets selected dimensions, the framework is broader and more comprehensive in scope.

Table A.1 — Mapping to OECD proposed performance framework

Proposed OECD concept of performance [21]	Mapping to 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

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 the framework is to define specific data elements and provide data, rather than the development of a single, comprehensive, high-level taxonomy.

Table A.2 — Mapping to the OECD health data

OECD health data main data fields	Mapping to health indicators conceptual framework
Health status	Health status
Health care resources	Community and health care system characteristics
Health care utilization	Health status Health system performance 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	Determinants of health
Demographic references	Community and health care system characteristics
Economic references	Community and health care system characteristics

In 2001 the OECD launched the Health Care Quality Indicators (HCQI) Project. A framework was developed within the scope of that project [25]. Since it was based largely, although not exclusively, on the framework presented here, and includes many of the same dimensions, there is a high degree of correspondence between the two.

The current OECD initiatives are complementary to the health indicators conceptual framework presented by this International Standard. While OECD work uses data and health indicators as a starting point and focus, this International Standard proposes the creation of a framework at a conceptual level, eventually leading to the identification of comparable and relevant data.

Annex B
(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, Reference [56], 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, at the 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 to be measured.

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 provide a 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 shared reference points 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 a health policy. A well-defined conceptual framework will also foster 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 C
(informative)

Background on the health indicators conceptual framework

The health indicators conceptual framework specified within this International Standard 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, genetic endowment and individual behavioural and biological response (see, for example, Reference [13] for a detailed discussion of this model). 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. Although the term *population health* has not been clearly defined, 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 [26].

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 can result[1)]. 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 [39]. Consider the following questions:

— Are differences in access to preventive services, as evidenced by disparities in the use of screening mammographies, attributable to health care system factors or differences in awareness that may be linked to education?

— Are differences in the prescription 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 to other factors?

In order to address such questions, the conceptual health indicators framework includes a broad spectrum of factors for consideration. These may be associated with, but not necessarily due to, outcomes. It is not possible to make a clear association between cause and effect without a more detailed analysis incorporating the many variables that should be examined in complex health care systems. They do, however, point to the other aspects which should be considered when undergoing more robust analyses. As a result, this allows jurisdictions to determine if there is an issue to be addressed, what it is and, through further analysis, to understand what could be done for improvement to occur. Key issues are

— the overall health of the population served, and how it compares to other jurisdictions;

— the major 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.

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1) The postulate that medical care in itself has *not* been the most important source of improved longevity is supported by several authors (e.g. [5], [35], [36] and [37]) who demonstrate that general improvements in the quality of life, rather than health care, have been responsible for reductions in mortality in the 20th century. While other authors assert that the contribution of health care has not been negligible (see [34] and [44]), the assumption that medical care has been the *most* influential determinant of improvements in health cannot be accepted.

While most frameworks focus on the 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. The health indicator framework developed by the Canadian Institute for Health Information (CIHI) [7], on which this framework and the corresponding definitions are 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; this is also the case in Australia [25].

It should be recognized that different types of conceptual framework may be defined. While some frameworks clearly articulate the underlying causal relationships between various components of the system under consideration, others are developed solely for the purpose of classifying or categorizing the principle components they consider. The framework proposed in this International Standard 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 determinants of health on health status or health system performance. But even within each dimension, significant interrelationships may exist. Examine 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 D
(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.

In 1986, in the WHO's Ottawa Charter for Health Promotion, it was declared that health is “a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities”.

It should be recognized that some conditions considered within this dimension may in themselves act as risk factors for other diseases, such as the effect of diabetes on kidney disease. There are many such relationships and interdependencies between health status and other dimensions. For example, in the case of diabetes, childhood behaviours, such as diet or physical activity, may determine obesity levels that can have a significant effect on the risk of diabetes. This, in turn, can have implications for health services, health promotion, prevention, risk assessment, and management of diabetes.

Annex E
(informative)

Determinants of health

Patterns of health behaviour, 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 the determinants of health. Typically, these may be reflected by factors such as youth smoking, smoking cessation, exercise or breastfeeding.

On the other hand, living and working conditions reflect a broad array of socio-economic 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, socio-economic characteristics may also be highly correlated with other determinants of health. Individual risk behaviours may vary with socio-economic status, and this may be reflected in social inequalities in mortality rates [4][8][11][12][38][52][55]. 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 [10][16][17][30][45]. Also, unemployment rates have been shown to be related to mortality rates and other health outcomes [15][23][28][40]. Indicators reflecting the determinants of health should therefore encompass both health and social factors.

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 [43]. The link between social relationships and health is well established [20]. 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 20 years [19].

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 [43]. 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 [1][53], and may be effective in health promotion [18][33]. Furthermore, social capital may mediate the effects of income, income inequality or poverty on health status [9][24][41][42].

Environmental factors refer to the effects of the physical environment on health. These may include measures for the improvement of water, air or soil quality, for example. Measures counteracting environmental risks may be most beneficial where a clear epidemiological 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 [2].

Annex F
(informative)

Health system performance

The third dimension of the health indicators 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 below.

The first two categories within this dimension represent the *responsiveness* of the health care system. This categorization refers to responsiveness to the non-medical requirements of the users of health care systems (similarly defined in Reference [49]). On the one hand, acceptability is considered 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, Reference [31]).

Competence and continuity are two sub-dimensions of health system performance that have been defined, but may be more difficult to measure using existing data. Competence, for example, may be difficult to assess at an aggregate level, but must be considered a critical determinant of health system performance. Continuity of care, whether defined as continuity between the patient and provider, or between providers of care, is an important construct as health care systems 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 resource use, are perhaps the most familiar concepts in performance assessment. Do vaccination programmes 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? 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) [54].

"Safety" addresses risks to patients that are posed either by the environment in which health services are delivered or the interventions offered (i.e. adverse events, error and iatrogenesis). Recently, much attention has focused on the burden of medical error in Britain (e.g. Reference [14]), the United States (e.g. References [29] and [32]), or Canada (e.g. Reference [3]). While the health care industry is certainly not the first to discover safety problems, changes to improve safety, such as automated physician order entry systems and bar coding, are becoming priorities 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 G
(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 that are not direct measures of either health status, 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). Secondly, 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. Thirdly, 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). Also, as with many indicators, the indicators included in this dimension may also represent other aspects of health or health care, depending on the underlying rationale or intended use.

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.). Admittedly, depending on the rationale for the specific indicators identified, some could have multiple interpretations. For example, the number of procedures performed may serve as a proxy for access, as well as demand. For this reason, they should be used in conjunction with other indicators identified in the framework.

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; it reflects characteristics of the health care system rather than performance. 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 higher case-fatality rates following surgical procedures are ascribed a negative interpretation), these contextual indicators, which describe the community and/or health system characteristics, may not. On the other hand, while the proportion of the population residing in urban areas may be very useful in interpreting other data, a higher proportion cannot in itself be interpreted 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 H
(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 cross-cutting 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 [48][51]. A report prepared for the organization emphasized that inequities in health status among different groups and 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 [46]. Reference [46], p.7, states that equity in health is "a fair opportunity [for people] 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 have the potential to be reduced or eliminated.

Thus, while it is essential to measure equity in terms of the "quantity" and "quality" of health (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, and an equity analysis can be performed on various levels. Most commonly, however, equity is understood as being related to socio-economic status. Other dimensions of equity might include sex, age, ethnicity or rural/urban residence, for example, or as being related to access, such as proximity to health services. Moreover, the concept and definition of equity may differ between countries.

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