

# Public Health Classifications Project – Determinants of Health

Phase Two: Final Report



Health

# Acknowledgements

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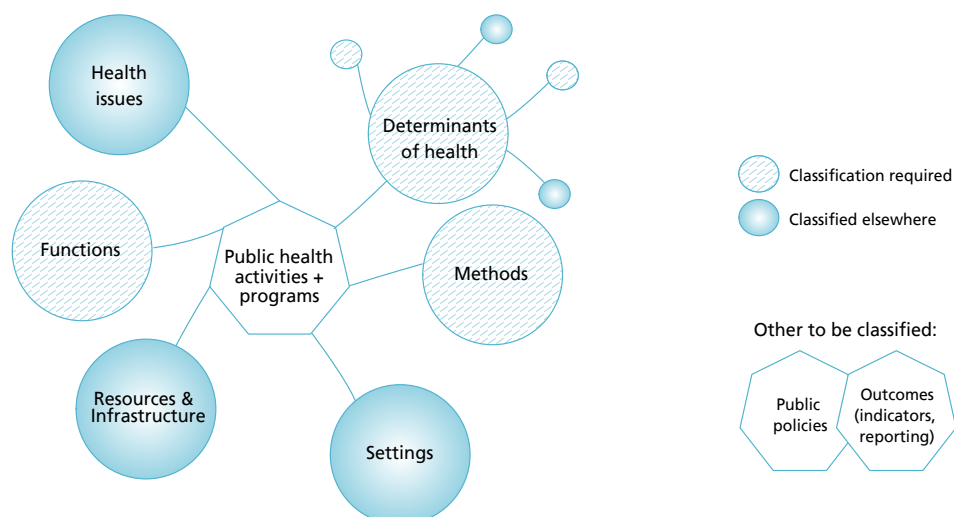
# Executive Summary

The results of the second phase of a two-phase project to develop a public health classification are presented in this report. The Public Health Classifications Project aimed to 'develop and endorse a higher level classification that captures the breadth and scope of public health activity and provides a unified framework for multiple uses'. A unified framework would improve the quality and consistency of reported information on public health activity, performance, investment and expenditure.

At the conclusion of the first phase, the broad structure of a classification of public health consisting of six top-level classes was proposed as shown in Figure 1. Existing international classifications are available to classify various areas including some 'Determinants of health'.

Further development of classifications for the absent top levels was seen as a priority. Phase two of the Project, reported here, further developed the single class Determinants of health, hoping to contribute to the development of the 11th revision of the World Health Organization's *International Statistical Classification of Diseases and Related Health Problems (ICD)* due for completion in 2014.

Figure 1: A model of public health classification



Source: Adapted from Gruszyn S, Jorm L, Churches T, Straton J: *Public Health Classifications Project Phase One: Final Report*. Melbourne: National Public Health Partnership; 2005, p. 22.

Determinants of health are defined as:

The range of behavioural, biological, socio-economic and environmental factors that influence the health status of individuals or populations.

– Adapted from the World Health Organization 1998. Health promotion glossary. Geneva: WHO, p. 6.

The following assumptions were adopted to guide development (after Kelly et al. 2008:e14):

1. there are determinants of health that include social, economic, psychological and physiological factors;
2. determinants (a) impact on individuals to produce individual level pathology and (b) produce highly patterned health differences in populations, reflecting societal inequalities;
3. determinants work through discernable causal pathways; causal pathways help identify ways of preventing and ameliorating disease; there are also causal pathways for the promotion of health; and
4. positive and negative causal pathways cross physical, biological, social, economic, political and psychological discipline boundaries.

Specifying these assumptions raised a number of issues that were debated during the project and which are briefly reported. Use cases were developed for both clinical and public health uses to demonstrate the potential benefits of being able to classify individuals and groups by systematically describing determinants of health. A set of principles to guide the development of the classification were also adopted.

## Methods

A Working Group brainstormed and then refined an initial version of a classification. Existing determinants of health frameworks were reviewed and various options were examined and debated in order to produce an over-arching Determinants of Health Classification that could be of use for both public health purposes and the needs of a revised ICD. Option 2, a 'full coverage' model was considered the most useful for further development as it was inclusive of determinants that affect both the developed and developing parts of the world, the scope extended beyond 'social' determinants, and it was regarded as being more useful, in terms of informing the ICD revision process, than an in-depth exploration of a partial set of determinants.

A four part structure for the top level of a Determinants of Health Classification was developed after a scan of existing frameworks identified that most had from four to seven structural classes:

- Behavioural;
- Biological;
- (Physical) Environmental; and
- Socio-economic.

Both 'top-down' and 'bottom-up' methods were used to construct the classification. Top-down methods explored and tested existing frameworks using bottom-up lists of terms to ensure that the top levels offered adequate coverage. Bottom-up lists of nominated health determinants were derived from a range of previous work. While the Working Group made considerable progress using these methods, the resulting classification is an early prototype for discussion and further refinement, rather than being in any way definitive.

## Results

An overview of the Determinants of Health Classification proposed by this Project is presented in Table 1. A similar scheme to that used by the *International Classification of Functioning, Disability and Health* (ICF) to describe Environmental Factors is envisaged whereby terms are neutral and are qualified for instances of use (WHO 2001). For example, 'Water quality' is neutral as a description of a determinant of health, but can be qualified as to whether it is a positive or negative determinant (eg safe drinking water, polluted drinking water).

ICF Environmental Factors were extensively reviewed during the Project with the intention to use existing terms wherever possible. However, there was little conceptual correspondence with the known major determinants of health. A detailed example is given of the attempt to find conceptual equivalence with a specific determinant. The ICF's approach identifies the 'constituents' rather than the 'consequences' or 'determinants' of health and it was beyond this Project's resources to identify how the ICF would need to be changed to deal conceptually with most determinants, or vice versa; however, some portions are suggested for inclusion (marked with an 'S' in the Biological and Socio-economic determinant of health classes).

The top level classes in the Determinants of Health Classification proposed by this Project are described in some detail with definitions provided for each. In general, there was little to guide the mid-level development of each class in the extensive literature searches that were undertaken. The findings and issues arising are discussed in each relevant section and a summary of the issues that require more deliberation is in Table 2.

The Working Group hopes that readers will find this report a useful contribution to a major topic deserving further development and commends the report to interested parties for their consideration and further contributions.

Table 1: Determinants of Health Classification work in progress: overview

| DETERMINANTS OF HEALTH (DoH) Symbols ± § B P denote existing classifications –see notes below.  |  |  |   |
|---|--|--|---|
| BEHAVIOURAL DoH   | BIOLOGICAL DoH   | (PHYSICAL) ENVIRONMENTAL DoH   | SOCIO-ECONOMIC DoH  |
| <ol style="list-style-type: none"> <li>Risk and/or protective behaviours</li> <li>Responses to health problems</li> </ol>   | <ol style="list-style-type: none"> <li>Genetic</li> <li>Body structure</li> <li>Body functioning</li> </ol>  | <ol style="list-style-type: none"> <li>Water quality</li> <li>Air quality</li> <li>Climate and geography</li> <li>Built environment</li> <li>Food safety</li> <li>Land and soil quality</li> </ol>   | <ol style="list-style-type: none"> <li>Social</li> <li>Economic</li> </ol>  |
| <p><b>1. Risk and/or protective behaviours</b></p> <ul style="list-style-type: none"> <li>Alcohol use</li> <li>Breastfeeding</li> <li>Diet</li> <li>Dietary supplement use</li> <li>Hygiene</li> <li>Illicit drug use</li> <li>Immunisation</li> <li>Oral health behaviours</li> <li>Pharmaceutical use</li> <li>Physical activity</li> <li>Protective clothing use</li> <li>Screening behaviours</li> <li>Seat belt use</li> <li>Sexual activity</li> <li>Sun exposure protective behaviours</li> <li>Tobacco use</li> </ul> <p><b>2. Responses to health problems</b></p> <ul style="list-style-type: none"> <li>Care seeking</li> <li>Compliance with medical treatment</li> <li>Health care service use behaviours</li> <li>Pain behaviours</li> <li>Response to illness</li> </ul> | <p><b>1. Genetic</b></p> <ul style="list-style-type: none"> <li>Single-gene</li> <li>Chromosomal</li> <li>Multifactorial</li> <li>Mitochondrial DNA-linked</li> </ul> <p><b>2. Body structure</b></p> <ul style="list-style-type: none"> <li>Height</li> <li>Weight</li> <li>Waist-hip ratio</li> <li>Bone density</li> </ul> <p><b>3. Body functioning</b></p> <ul style="list-style-type: none"> <li>Blood pressure</li> <li>Nutritional status</li> <li>Biochemical function</li> <li>Sensory function</li> <li>Movement and balance</li> <li>Strength and robustness</li> <li>Fitness</li> </ul> | <p><b>1. Water quality</b></p> <ul style="list-style-type: none"> <li>Drinking water quality</li> <li>Recreational water quality</li> <li>Recycled water quality</li> </ul> <p><b>2. Air quality</b></p> <ul style="list-style-type: none"> <li>Ambient air quality</li> <li>Indoor air quality</li> </ul> <p><b>3. (Effects of) Climate and geography</b></p> <ul style="list-style-type: none"> <li>Solar radiation</li> <li>Temperature</li> <li>Rainfall</li> <li>Fire</li> <li>Severe weather events</li> <li>Salinity</li> <li>Sea level rise</li> </ul> <p><b>4. Built environment</b></p> <ul style="list-style-type: none"> <li>Transport [e.g. road traffic accidents]</li> <li>Public open space</li> <li>Noise</li> <li>Biological hazards</li> <li>Material hazards [e.g. asbestos, lead]</li> <li>Housing quality</li> <li>Chemical hazards</li> <li>Radiological hazards</li> <li>Electromagnetic hazards</li> </ul> <p><b>5. Food safety</b></p> <ul style="list-style-type: none"> <li>Contamination</li> <li>Quality</li> </ul> <p><b>6. Land and soil quality</b></p> <ul style="list-style-type: none"> <li>Contamination</li> <li>Pesticides</li> </ul> | <p><b>1. Social</b></p> <ul style="list-style-type: none"> <li>ATTITUDES (who holds them) §</li> <li>Community involvement, civic engagement, bridging social capital P</li> <li>Culture</li> <li>Ethnicity</li> <li>Gender</li> <li>Health cognition</li> <li>Language</li> <li>Religious belief or spirituality</li> <li>Safety and security</li> <li>Social class/ caste</li> <li>Social and support networks P incl SUPPORT AND RELATIONSHIPS (who provides them)§</li> <li>Trust P</li> </ul> <p><b>2. Economic</b></p> <ul style="list-style-type: none"> <li>Education</li> <li>Employment status B</li> <li>Financial resources</li> <li>Housing availability</li> <li>Industry B</li> <li>Literacy and health literacy</li> <li>Living standard</li> <li>Occupation B</li> <li>SERVICES, SYSTEMS AND POLICIES (incl. HEALTH SERVICES, SYSTEMS AND POLICIES) §</li> </ul> |

Symbols denoting existing classifications: ± ICD § ICF (CAPITALS indicate whole ICF chapters: e.g. ATTITUDES), B ILO classifications; P AIHW AusWelfare framework.

Table 2: Determinants of Health Classification: Summary of issues for further consideration

|   |  |
|---|--|
| Top-level classes                             | <ul style="list-style-type: none"> <li>Is there agreement on the top-level classes?</li> <li>Are the differences between the classes clear and useful?</li> <li>Are all important determinants captured?</li> </ul>  |
| Biological determinants                       | <ul style="list-style-type: none"> <li>Is the top level classification of the Biological determinants appropriate?</li> <li>Are all important determinants captured?</li> <li>Should clinically treated – or treatable – determinants be classified by ICD while those that are not treated – or non-treatable – are classified as determinants of health?</li> <li>When is blood pressure or hypertension a determinant of health and when is it a condition or disease that should be classified by ICD? For example, well-managed hypertensives no longer produce high blood pressure readings.</li> <li>When are body dysfunctions determinants of health and when are they dimensions of health or health status? For example, a touch dysfunction could be a risk factor for burns, but is it (also?) a health status indicator in its own right?</li> </ul> |
| Environmental and Socio-economic determinants | <ul style="list-style-type: none"> <li>Is the division between (Physical) Environmental and Socio-economic determinants appropriate?</li> <li>Are all important determinants captured?</li> <li>How can the difference between ecological and individual attributes be better handled?</li> </ul>  |
| Other issues                                  | <ul style="list-style-type: none"> <li>Where should multi-system or multi-class determinants be placed, eg Stress, Psychosocial determinants such as Mood and Traumatic exposure?</li> <li>Is it necessary for top-level or lower level classes to be mutually exclusive?</li> </ul>   |

# Introduction

This report presents the results of the second phase of a two-phase project to develop a public health classification. It is hoped that readers will find the report a useful contribution to a major topic deserving of further development. The Working Group commends the report to interested parties for their consideration and further contributions.

## 1.1 The public health classification project

The aim of the Public Health Classifications Project overall was to 'develop and endorse a higher level classification that captures the breadth and scope of public health activity and provides a unified framework for multiple uses'. A unified framework would improve the quality and consistency of reported information on public health activity, performance, investment and expenditure.<sup>1</sup>

The general approach adopted to produce a public health classification in phase one of the Project was to be inclusive, and to allow decisions about specific exclusions to be made at later stages when developing individual applications and uses of the classification. There was consensus among the public health experts consulted, that a public health classification should be multi-dimensional, and there was broad agreement on the top-level classes that should be included. At the conclusion of the first phase, the broad structure of a classification of public health consisting of six top-level classes was proposed:

- (Public health) Functions,
- Health issues,
- Determinants of health,
- Settings,
- Methods (of Intervention), and
- Resources and Infrastructure.

As shown in Figure 2, existing classifications (such as the international classifications of: diseases and related health problems [ICD], functioning and disability [ICF], and external causes of injuries [ICECI]) are available to classify 'Health Issues', 'Settings' and 'Resources', and potentially some 'Determinants of health'. The further development of classifications for the top-level classes of 'Functions', 'Determinants of health' and 'Methods' was seen as a priority.

Phase two of the Project, reported here, further developed the single class 'Determinants of health'.

## 1.2 Scope and domain

The scope of phase two of the Public Health Classifications Project was the development of the Determinants of health class in the multiaxial Public Health Classification (PHont). Further development of this class was identified as a high priority given the development of the 11th revision of the World Health Organization's *International Statistical Classification of Diseases and Related Health Problems* (ICD) due for completion in 2014. The purpose was to contribute a piece of work as input to the ICD revision process and to further develop PHont.

The scope of phase two was broad and inclusive, in line with the principles of development for the Project (see 1.2.5).

### 1.2.1 Definition

Determinants of health are defined as:

The range of behavioural, biological, socio-economic and environmental factors that influence the health status of individuals or populations.

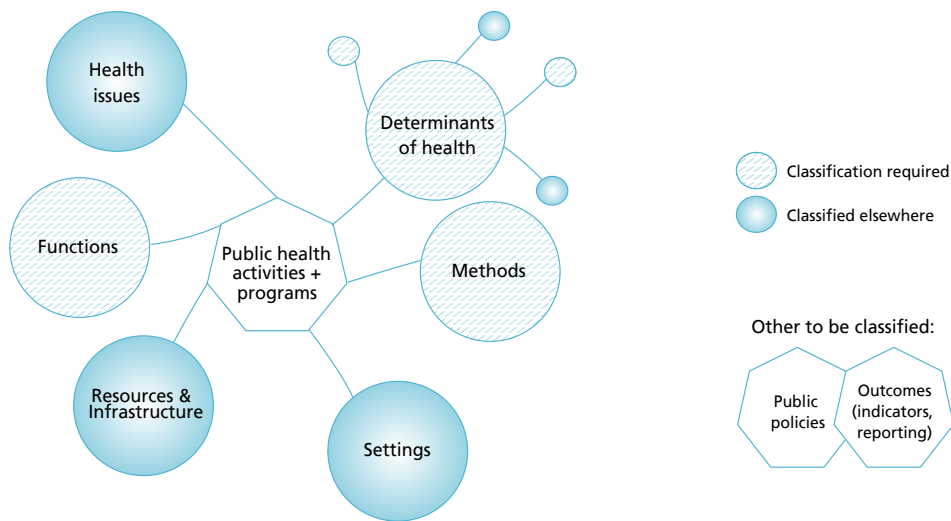
—Adapted from the World Health Organization 1998. *Health promotion glossary*. Geneva: WHO, p. 6.

The definition explicitly includes physiological, including genetic, determinants of health; both risk and protective factors that determine health; and the impact of the health system on health. Appendix A contains alternative definitions of determinants of health.

<sup>1</sup> The report of Phase One of the Project is available at: <[www.publichealth.gov.au/pdf/reports\\_papers/technical%20papers/ph\\_classifications\\_report\\_phase01.pdf](http://www.publichealth.gov.au/pdf/reports_papers/technical%20papers/ph_classifications_report_phase01.pdf)>. A briefer article that describes it is available in *ANZ Health Policy* at: <[www.anzhealthpolicy.com/content/6/1/9](http://www.anzhealthpolicy.com/content/6/1/9)>.



Figure 2: A model of public health classification



Source: Adapted from Gruszyn S, Jorm L, Churches T, Straton J: *Public Health Classifications Project Phase One: Final Report*. Melbourne: National Public Health Partnership; 2005, p. 22.

### 1.2.2 Assumptions

The following assumptions were adopted to guide development of the Determinants of Health Classification (after Kelly et al. 2008:e14):

1. there are determinants of health that include social, economic, psychological and physiological factors;
2. determinants (a) impact on individuals to produce individual level pathology and (b) produce highly patterned health differences in populations, reflecting societal inequalities;
3. determinants work through discernable causal pathways; causal pathways help identify ways of preventing and ameliorating disease; there are also causal pathways for the promotion of health; and
4. positive and negative causal pathways cross physical, biological, social, economic, political and psychological discipline boundaries.

Some of these assumptions were considered to be debatable, particularly assumption three. At issue was the idea that determinants must work through 'discernable causal pathways' in producing patterned health differences in *populations*, because these pathways are complex, multi-factorial and not necessarily well-elucidated, at least given the current state of knowledge. It was noted, however, that the Commission on Social Determinants of Health (CSDH) recognised similar concepts of social patterning. The CSDH has stated that: "The main social pathways and mechanisms through which social determinants affect people's health can usefully be seen through three perspectives: (1) 'social selection', or social mobility; (2) 'social causation'; and (3) lifecourse perspectives". These are not seen as mutually

exclusive, but complementary; and all three contribute elements to the CSDH framework (CSDH 2007:15).

The nature of 'cause' *per se*, and causal determination (using, for example, the Bradford Hill [1965] causality criteria, still described as 'the best available criteria for causal inference' [Swaeen & van Amelsvoort 2009:270]), were also debated conceptually in relation to determinants of health. General debate about how and when the impact of a determinant can be agreed to be causative is ongoing. Kundi (2006:969) notes that the 'so-called criteria of causation', while frequently applied, were never meant 'as criteria nor as a checklist' for the attribution of causal relationships, and that there is a 'tendency to misinterpret lack of evidence for causation as evidence for lack of a causal relation', although there are no criteria to reject causation. Kelly et al. (2006:14) remark that in relation to the social determinants of health, 'we are able to identify some of what are the necessary and the sufficient conditions but the nature of which are which and under what circumstances, is very unclear'.<sup>2</sup> The Working Group concluded that determinants, for the purposes of the

2 Although Kelly et al. (2006:14) go on to state that 'The core candidates can be listed relatively easily because the extant literature has explored them at length: occupational exposure to hazards, occupational experience of relations at work (degree of self direction for example), the biological aging process, the experience of gender relations, the experience of ethnic relations including direct experience of racism, home circumstances, degree and ability to exert self efficacy especially through disposable income, dietary intake, habitual behaviours relating to food, alcohol, tobacco and exercise, position now and in the past in the life course, schooling, marital status and socio economic status. These are the media through which the social world impacts directly on the life experiences and exert direct effects on the human body. They in turn are linked to macro variables like the class system, the housing stock, the education system, the operation of markets in goods and labour and so on'.

Project, could include factors known to affect the probability of an outcome in a significant fashion, even where there was not currently a well-elucidated causal pathway.

Other issues debated by the Working Group included, for instance, the fact that determinants of health not only influence health but also affect the health outcomes that then determine health, as do the various systems that operate post-disease to moderate outcome, such as the health and social support systems (see, for instance, Stolk et al. 2008).

Also debated was the usefulness or otherwise of the distinction popularised in the *2002 World Health Report* (WHO 2002a) which distinguished between so-called 'proximal' and 'distal' causative factors; with proximal having a direct effect on a person's health (eg smoking), and distal having a more indirect impact (eg poor housing conditions increase the risk of acquiring some diseases; low income may lead to poor nutrition and housing). On the contra side was the argument that the proximal/ distal terminology conflates the concepts of space, time, causal strength, and levels (eg individual, household, area or group) and muddies the analytic waters (Krieger 2008).

### 1.2.3 Boundary issues

Existing international classifications related to health include determinants of health that are variously described or titled as health-related 'risk factors', 'reasons for [health-related] encounters' or 'contextual factors'. For example:

- Chapter XXI of the tenth revision of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10), titled 'Factors influencing Health Status and Contact with Health Services' contains Z-codes: for 'potential health hazards related to socioeconomic and psychosocial circumstances', problems related to lifestyle, life-management difficulty, and care-provider dependency, among others;<sup>3</sup>
- Chapter XX of the ICD-10, 'External causes of morbidity and mortality' contains a number of factors (such as alcohol involvement, operations of war) that affect the risk of injury and/or death;
- the *International Classification of Functioning, Disability and Health* (ICF) includes a major section on 'Environmental Factors' as part of 'Contextual Factors';
- the *International Classification of Primary Care* (ICPC) includes a patient's 'Reasons for Encounter' classification as one of its three classification systems.

In calling for a Classification of Health Risk Factors, Madden (2008) powered his argument with the *2002 World Health Report's* emphasis on recognising and addressing risk factors in the health system, noting that both protective and risk factors should be included.

It is highly desirable that the next edition of the ICD (ICD-11) includes a more complete description of determinants of health than that contained in previous editions. The inclusion of a more complete Determinants of Health Classification would also contribute towards filling a substantial existing gap in the World Health Organization Family of International Classifications (WHO-FIC).

An Information Content Model developed as part of the ICD revision includes a series of characteristics or attributes for each entity in the ICD (Figure 3). The Model includes Risk Factors as a characteristic.

A working paper on the Project's development of a Determinants of Health Classification was put to the WHO ICD Revision Steering Group meeting (April 2009). There was significant interest in seeing the outcome of the Project and for a further paper to be presented in April 2010.

### 1.2.4 Potential uses

Use cases demonstrate the potential benefits deriving from the ability to classify individuals and groups by systematically describing determinants of health, in addition to classifying health conditions and functioning and disability. Potential use cases relating to the clinical care of individuals are summarised in Table 3 while public health use cases are in Table 4.

Different situations of need for determinants of health information are recognised. For individuals and groups of patients treated in hospitals and other clinical settings, knowledge of factors that may influence the choice of treatment or the disease recovery process can improve their treatment plan and case management. Similarly, determining risk factors that need to be addressed in order to prevent secondary injury or disability may prevent or minimise later health problems. Adjusting for risk is necessary to make valid comparisons of the results of clinical trials, healthcare-related performance, cost-effectiveness and cost-benefit studies (Table 3).

<sup>3</sup> Extracted from NCCH eBook, July 2008, List of Three-Character Categories.

Figure 3: ICD Information Content Model

| <b>Any category in ICD is represented by:</b><br><b>TITLE OF ENTITY:</b> Name of disease, disorder or syndrome...  |   |
|--|---|
| 1. <b>Textual definition</b><br>2. <b>Synonyms – Inclusion – Exclusion – Index terms</b>   |   |
| <b>Descriptive characteristics</b><br>1. <b>Type</b><br>Disease, disorder, syndrome, injury, sign/symptom, external cause, reason for encounter;<br>2. <b>Body system(s)</b> <i>(physiology)</i><br>3. <b>Body part(s)</b> <i>(anatomical site)</i><br>4. <b>Manifestation attributes</b><br>a. Signs and symptoms<br>b. Diagnostic findings<br>5. <b>Causal properties</b> <i>(etiology)</i><br>a. Causal mechanisms/agents<br>b. Risk factors<br>c. Genomic characteristics<br>6. <b>Temporal properties</b><br>7. <b>Severity and/or extent</b><br>8. <b>Functional properties</b><br>9. <b>Treatment</b> | <b>Maintenance attributes</b><br>A. <b>Unique Identifier</b><br>B. <b>Subset, adaptation and special view flag</b><br>1. Primary care<br>2. Clinical care<br>3. Research<br>4. Special indices (e.g. Public Health Indices or Resource Groupings)<br>C. <b>Hierarchical relationships:</b><br>parents and children in ICD structure<br>D. <b>Mapping relationships:</b><br>linkages to other systems like SNOMED etc<br>E. <b>Other rules</b> |

Source: World Health Organization 2009. ICD Content Model [from slides provided by R Madden].

Table 3: Clinical use cases for determinants of health (DoH)

| Aggregation | Use cases  | Related questions that a DoH Classification should help answer   |
|-------------|--|--|
| Individual  | Classify individual hospital patients  | What are the risk factors for this person that could impact on their hospital stay or treatment response?  |
|             | Manage individual risk course  | What risk factors need to be addressed to improve the treatment outcome for this person? (eg mobility or cognitive limitations complicate proposed drug regimes)   |
| Group       | Record DoH relevant to case management and secondary purposes (eg prevention)            | What are the risk factors for this group that should be addressed to improve their outcomes? What risk factors did this group have in common that could be addressed to prevent further occurrences?   |
|             | Compare clinical outcomes (eg clinical trials); remove or adjust for the effects of risk | How are clinical outcomes affected by various determinants of health (eg education, income, area)? How can the effects of treatment selection bias and differing patient mix be removed or adjusted for so that clinical outcomes are truly comparable (eg smoking, BMI)? (Stukel et al. 2007). What are the factors that affect patients' ability to comply with treatment requirements? (eg lack of income to pay for drugs, lack of transport to attend clinic) |
|             | Contribute to costing information (eg casemix) and comparison                            | How does this risk factor affect hospital length of stay for common procedures/ diagnoses? (eg obesity, smoking) How can variations in costs for the same treatment/ procedure be explained?   |
|             | Evaluate costs and benefits  | What is the contribution of a risk factor to morbidity, mortality and health care use primarily related to other diseases/ conditions? (eg impact of obesity on cardiovascular disease, diabetes mellitus) How does a risk factor influence the outcomes of surgical procedures? (eg impact of body weight on joint replacement, bariatric surgery)  |
|             | Measure performance  | How does surgical mortality vary between hospitals A and B, after adjusting for differences in their patient populations?  |
|             | Assess quality and safety standards  | How do rates of wound infection vary between hospitals A and B, after adjusting for differences in their patient populations?  |
|             | Research   | Range of questions and hypotheses.   |

Statistical information on groups can be used to determine whether and which risk factors are implicated in causes of death and poor health, and whether these situations are improving or worsening over time. Other public health use cases range from monitoring the health of the population to designing policies and interventions to address those groups with the most inequitable health and illness outcomes and to modify preventable health risk factors and other determinants of health including social conditions (Table 4).

Table 4: Public health use cases for determinants of health (DoH)

| Use cases  | Related questions that a DoH Classification should help answer  |
|--|---|
| Report statistical information (eg morbidity, mortality)                 | What proportion of hospital separations were for smokers?<br>How many people fell ill through exposure to contaminated food?<br>What was the age-standardised incidence of COPD among smokers? How did this compare with non-smokers?   |
| Monitor population health; identify and address health inequities        | Why do people in Area A have more respiratory disease than those in Area B?<br>Why do urban people have longer median survival times after diagnosis of cancer than rural people?   |
| Design and target interventions  | How many young mothers in different local areas smoke tobacco and what are the impediments to smoking cessation that can be addressed in tailored programs?<br>What environmental factors are associated with the risk of falling among older people? (eg safe footpaths, fears about personal safety, lack of green space) |
| Attribute contribution to disease burden                                 | How much of the burden of various conditions and diseases can be attributed to different determinants of health? (eg WHO 2002a)<br>How many deaths are attributable to smoking?<br>What are the combined effects of common clusters of determinants?  |
| Evaluate programs and interventions                                      | Was a 'walking bus' program to increase child physical activity as cost-effective in Area A (high SES, public and private schools), as in Area B (low SES, public schools only)?  |
| Model etiological pathways (causal strength and dependent relationships) | How many people were diagnosed for mesothelioma after being exposed to asbestos?<br>What are the necessary determinants for the acquisition of a condition or disease? (eg Popkin et al. 2006)<br>What determines the trajectory of a disease?  |
| Develop policy   | What are the manipulable social factors that determine health and are amenable to policy intervention?  |
| Research   | Range of questions and hypotheses.  |

The preceding tables show a selection of use cases envisaged for a Determinants of Health Classification rather than being definitive of all use cases.

### 1.2.5 Principles of development

Principles that guided the development of the classification of determinants of health, similar to those adopted in phase 1 of the Project, were:

- the classification should be multi-dimensional to be able to represent the multi-dimensional nature of determinants;
- different dimensions are of equal importance and a range of the most important need to be considered and developed concurrently;

- existing classifications of relevance should be used wherever possible;
- the classification should be inclusive and deliberately broad at the top levels. Boundaries can be set or moved as needed for particular applications but not used to restrict development; and
- the classification should be based on a multi-level, multi-determinant causal framework that incorporates both individual and ecological factors.

Determinants may be classed according to type (eg environmental, social, and behavioural determinants) and multiple types of determinants may be used to classify a 'case' or situation.

## SECTION 2

# Methods

The Working Group met ten times for periods of approximately two hours each, mostly in person and at premises provided by the Sax Institute to brainstorm an initial version of a Determinants of Health Classification. Early meetings concentrated on scoping the Project, revising and confirming the Project plan, the assumptions and principles of development. Additional existing determinants of health frameworks were reviewed and various options for development were examined and debated in order to produce an over-arching Determinants of Health Classification that could be of use for both public health purposes and the needs of a revised ICD.

The three major options for development that were considered were:

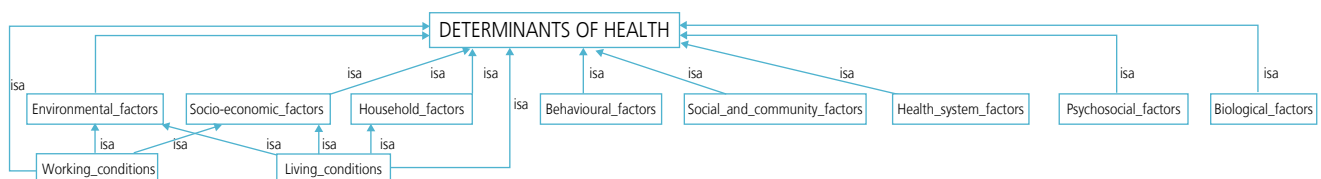
1. A model based on the WHO Commission on Social Determinants of Health conceptual framework (CSDH 2009);
2. A 'full coverage' model that included a range of determinants with relevance to different regions of the world, drawing on other work that had identified determinants of health applicable to developing (or 'high mortality') as well as developed (or 'low mortality') countries (WHO 2002a; Lin et al. 2005; Lopez et al. 2006); and
3. A model based on extending the existing PHont Determinants of health class by the addition of levels of aggregation, time, and effect.

Option 2 was considered to be the most useful as a base model for further development and as a source of potential subclasses because it was inclusive of determinants that affect both the developed and developing parts of the world, the scope extended beyond 'social' determinants, and it was regarded as being more useful, in terms of informing the ICD revision process, than an in-depth exploration of a partial set of determinants.

The initial 'full coverage' model was considered to have too many 'top level classes'. These included (in alphabetical order): Behavioural, Biological, Environmental, Health System, Household, Psychosocial, Social and Community, and Socio-economic Factors; together with two multiply inherited classes: Working Conditions, and Living Conditions.<sup>4</sup>

A scan of existing determinants of health (or equivalent) frameworks identified that most had from four to seven structural classes. For example, the Canadian Health Indicators Framework has four classes under Non-medical Determinants of Health (one of four tiers that include Health Status, Health System Performance, and Community and Health System Characteristics): Health Behaviours, Living and Working Conditions, Personal Resources (eg social support, life stress), and Environmental Factors (CIHI & Statistics Canada 2000:A-3). The International Organization for Standardization's Health Indicators Conceptual Framework has five classes under Determinants of Health (one of four tiers as per CIHI & Statistics Canada 2000 above): Health Behaviours, Socio-economic Factors, Social and Community

<sup>4</sup> The initial 'full coverage' top levels are illustrated below:



Factors (eg social support, social capital), Environmental Factors, and Genetic Factors (ISO 2001:2). Australia's National Health Performance Framework has seven classes under Determinants of Health: Person-related Factors, Early Life Factors, Health Behaviours, Community Capacity, Psychosocial Factors, Environmental Factors, and Socio-economic Factors (NHPC 2001:8).

Determinants of Health in the US' Healthy People 2010 number six in three tiers: Individual Biology, Behaviour, Physical Environment, and Social Environment; Policies and Interventions; and Access to Quality Health Care (US DHHS 2000).

Behaviour and Environment were classes in common across all frameworks; as was a Health System/Care tier, which is also included in the Services, Systems and Policies class (one of five in the ICF: Environmental Factors section, which also include: Products and Technology; Natural Environment and Human-made Changes to Environment; Support and Relationships; and Attitudes – see Appendix D) (WHO 2001). It was reported that although there have been calls for the development of the ICF: Personal Factors section (currently empty), debate remains both for and against this. 'Personality Factors' was also discussed, within the Project, as a potential top level class.

A four part structure for determinants is used in the WHO Family of International Classifications' (WHO-FIC) conceptual framework of the health system and factors influencing health (Madden, Sykes & Ustun 2007, based on a framework for the Australian health system [AIHW 2006]). The framework has been employed to identify the actual and required

coverage of international health-related classifications, as existing classifications apply mostly to the Health and wellbeing, and Interventions sections (Figure 4) (Madden, Sykes & Ustun 2007:10).

Accordingly, four similarly titled classes were adopted for the top level of a Determinants of Health Classification:

- Behavioural;
- Biological;
- (Physical) Environmental; and
- Socio-economic.

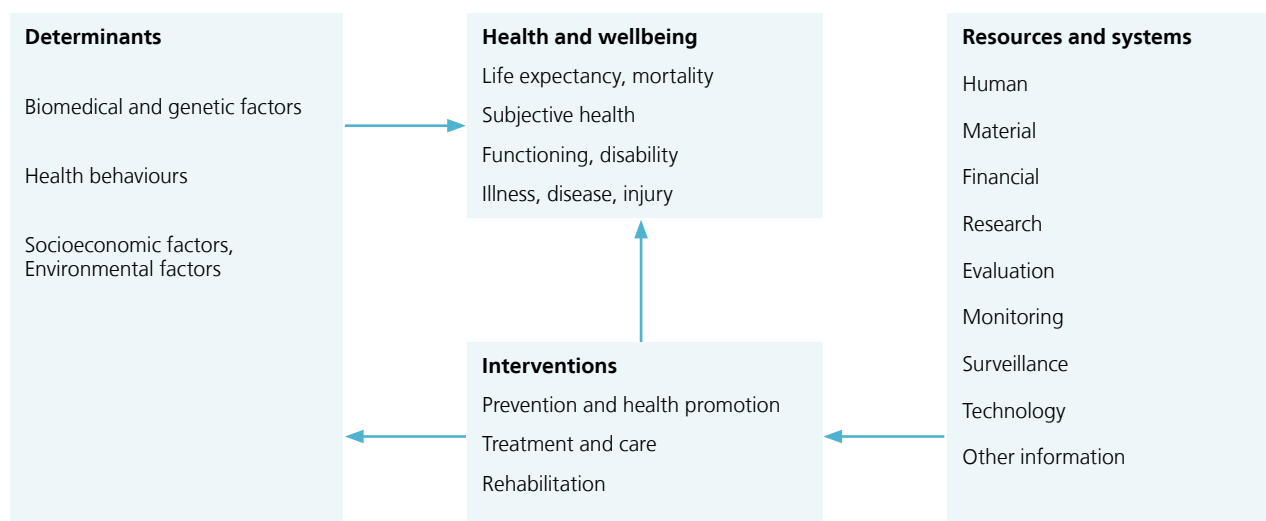
The working definitions of these top level classes are described in section 3.2 and in Table 6.

Later meetings reviewed prepared options, based on extensive literature searches (see Appendices B and C) that were undertaken for the purpose of organising individual determinants of health top level classes at lower levels. The development process was iterative and used the Protégé ontology software<sup>5</sup> in live sessions to explore different modes of organisation and class definitions.

Both 'top-down' and 'bottom-up' methods of constructing the classification were employed. Top-down methods looked for and tested existing frameworks and lower level conceptualisations using bottom-up lists of lowest level terms, to ensure that top level terms offered adequate coverage.

<sup>5</sup> Protégé is developed by Stanford University, see <http://protege.stanford.edu>.

Figure 4: WHO-FIC conceptual framework for health



Source: Madden R, Sykes C & Ustun B 2007. *World Health Organization Family of International Classifications: definition, scope and purpose*. Geneva: WHO, p. 11. (Based on AIHW 2006. *Australia's Health 2006*. Canberra: AIHW)

Bottom-up lists of nominated health determinants were drawn from a range of previous work including that on the Global Burden of Disease (Murray et al. 2001; Ezzati et al. 2004; Lopez et al. 2006) and the *2002 World health report: Reducing risks, promoting healthy life* (WHO 2002a) identifying the major risks affecting peer grouped countries according to different patterns of mortality, among other international comparisons of the greatest risks to health (eg UNDP 2002; WHO 2002b; World Bank 1993). Recent Australian Burden of Disease work was used as an example of health-related risk factors currently applicable to developed countries (Begg et al. 2007; Vos 2006). Bottom-up inputs were also drawn from academic and other reviews of particular areas.<sup>6</sup> Lastly, compilations of indicator suites also provided bottom-up inputs.<sup>7</sup>

While much progress was made using these methods, the Working Group does not claim to have arrived at a 'definitive' classification of determinants of health; rather it has produced a prototype for discussion and further refinement.

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6 Reviews included: Allender et al. 2008; Australian Institute of Health and Welfare 2001; Baum & Posluszny 1999; Bray 2003; Brownson, Haire-Joshu & Luke 2006; Bryant 2004; Doyle et al. 1999; Etches et al. 2006; Evans 2003; Galea & Vlahov 2005; Gochman 1997; Irwin et al. 2006; Jahiel 2008; Kelly et al. 2006; Michie & Abraham 2004; Mielewczyk & Willig 2007; Putnam & Galea 2008; Singh-Manoux, Macleod & Davey Smith 2003; Soskolne & Sieswerda 2002; Stillerman et al. 2008; Stuckler 2008; Wells 2006.

7 Indicator suites included: Canadian Institute for Health Information 2008; Centers for Disease Control and Prevention [2009]; Commonwealth of Australia 1994; International Organization for Standardization 2001; Lin et al. 2003; Kingsland 2006; Vickers & Lease 2008; von Schirnding 2002.

# Results

## 3.1 Overview

An overview of the Determinants of Health Classification proposed by this Project is presented in Table 5, followed by sections dedicated to the content of each of the four top level classes.

Note that a similar scheme to that used by the ICF to describe Environmental Factors is envisaged whereby terms are neutral and are qualified for instances of use (see Box 1). For example, 'Water quality' is neutral as a description of a determinant of health, but can be qualified as to whether it is a positive or negative determinant. Positive qualification would be used for terms that describe health-protective determinants (eg 'safe drinking water'). Negative qualification would be used for terms that describe health-risk determinants (eg 'unsafe for human consumption/ polluted/ contaminated drinking water').

Not all determinants of health require or necessarily have both positive and negative qualifications, for example, 'tobacco use' currently has only negative (health-risk) characteristics.

### Box 1: International Classification of Functioning, Disability and Health: Environmental Factors

'Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives' (WHO 2001:171).

'These are recorded as either facilitators or barriers (both on a 5-point scale) to indicate the effect they have on the person's functioning' (AIHW 2001:259).

The ICF major section Environmental Factors (as defined in Box 1), was extensively reviewed throughout the Project with the intention to use it wherever possible as an existing classification. There was however, little conceptual correspondence with the known major determinants of health.

For instance, in relation to the (physical) environment, the quality of drinking water – whether it is safe for humans to

drink or not – is an important determinant of health (WHO 2002a; Briggs 2003:11; Kingsland 2006:18; Vickers & Lease 2008:21).

While the ICF is able to describe or classify (WHO 2001):

- 'Bodies of Water' (defined as: 'Features of bodies of water, such as lakes, dams, rivers and streams');
- 'Utilities Services' (defined in part as 'Services and programmes supplying the population as a whole with ... sanitation, water and other essential services ...'); and
- 'Drinking' (defined as 'Taking hold of a drink, bringing it to the mouth, and consuming the drink in culturally acceptable ways, mixing, stirring and pouring liquids for drinking, opening bottles and cans, drinking through a straw or drinking running water such as from a tap or a spring; feeding from the breast' in the Activities and Participation section);

these terms do not equate – neither singly nor in combination – with the concept of 'safe drinking water', the presence or absence of which is the known determinant of health.

### Box 2: International Classification of Functioning, Disability and Health as a 'components of health' – rather than a determinants of health, or a consequences of health – classification

'ICF has moved away from being a 'consequences of disease' classification (1980 version) to become a 'components of health' classification. 'Components of health' identifies the constituents of health, whereas 'consequences' focuses on the impacts of diseases or other health conditions that may follow as a result. Thus, ICF takes a neutral stand with regard to etiology so that researchers can draw causal inferences using appropriate scientific methods. Similarly, this approach is also different from a 'determinants of health' or 'risk factors' approach. To facilitate the study of determinants or risk factors, ICF includes a list of environmental factors that describe the context in which individuals live' (WHO 2001:4).



As the ICF notes, its approach identifies the ‘constituents’ rather than the ‘consequences’ or ‘determinants’ of health (Box 2). It was beyond this Project’s resources to identify how the ICF would need to be changed to deal conceptually with most determinants, or vice versa; however, those sections that it was possible to include are shown in Table 5, and are marked with an ‘§’ in the Socio-economic class.

Table 5: Determinants of Health Classification work in progress: overview

| DETERMINANTS OF HEALTH (DoH) Symbols ± § B P denote existing classifications –see notes below.  |   |  |   |
|---|---|--|---|
| BEHAVIOURAL DoH   | BIOLOGICAL DoH  | (PHYSICAL) ENVIRONMENTAL DoH   | SOCIO-ECONOMIC DoH  |
| 1. Risk and/or protective behaviours<br>2. Responses to health problems   | 1. Genetic<br>2. Body structure<br>3. Body functioning  | 1. Water quality<br>2. Air quality<br>3. Climate and geography<br>4. Built environment<br>5. Food safety<br>6. Land and soil quality   | 1. Social<br>2. Economic  |
| <b>1. Risk and/or protective behaviours</b> <ul style="list-style-type: none"> <li>Alcohol use</li> <li>Breastfeeding</li> <li>Diet</li> <li>Dietary supplement use</li> <li>Hygiene</li> <li>Illicit drug use</li> <li>Immunisation</li> <li>Oral health behaviours</li> <li>Pharmaceutical use</li> <li>Physical activity</li> <li>Protective clothing use</li> <li>Screening behaviours</li> <li>Seat belt use</li> <li>Sexual activity</li> <li>Sun exposure protective behaviours</li> <li>Tobacco use</li> </ul> <b>2. Responses to health problems</b> <ul style="list-style-type: none"> <li>Care seeking</li> <li>Compliance with medical treatment</li> <li>Health care service use behaviours</li> <li>Pain behaviours</li> <li>Response to illness</li> </ul> | <b>1. Genetic</b> <ul style="list-style-type: none"> <li>Single-gene</li> <li>Chromosomal</li> <li>Multifactorial</li> <li>Mitochondrial DNA-linked</li> </ul> <b>2. Body structure</b> <ul style="list-style-type: none"> <li>Height</li> <li>Weight</li> <li>Waist-hip ratio</li> <li>Bone density</li> </ul> <b>3. Body functioning</b> <ul style="list-style-type: none"> <li>Blood pressure</li> <li>Nutritional status</li> <li>Biochemical function</li> <li>Sensory function</li> <li>Movement and balance</li> <li>Strength and robustness</li> <li>Fitness</li> </ul> | <b>1. Water quality</b> <ul style="list-style-type: none"> <li>Drinking water quality</li> <li>Recreational water quality</li> <li>Recycled water quality</li> </ul> <b>2. Air quality</b> <ul style="list-style-type: none"> <li>Ambient air quality</li> <li>Indoor air quality</li> </ul> <b>3. (Effects of) Climate and geography</b> <ul style="list-style-type: none"> <li>Solar radiation</li> <li>Temperature</li> <li>Rainfall</li> <li>Fire</li> <li>Severe weather events</li> <li>Salinity</li> <li>Sea level rise</li> </ul> <b>4. Built environment</b> <ul style="list-style-type: none"> <li>Transport [eg road traffic accidents]</li> <li>Public open space</li> <li>Noise</li> <li>Biological hazards</li> <li>Material hazards [eg asbestos, lead]</li> <li>Housing quality</li> <li>Chemical hazards</li> <li>Radiological hazards</li> <li>Electromagnetic hazards</li> </ul> <b>5. Food safety</b> <ul style="list-style-type: none"> <li>Contamination</li> <li>Quality</li> </ul> <b>6. Land and soil quality</b> <ul style="list-style-type: none"> <li>Contamination</li> <li>Pesticides</li> </ul> | <b>1. Social</b> <ul style="list-style-type: none"> <li>ATTITUDES (who holds them) §</li> <li>Community involvement, civic engagement, bridging social capital P</li> <li>Culture</li> <li>Ethnicity</li> <li>Gender</li> <li>Health cognition</li> <li>Language</li> <li>Religious belief or spirituality</li> <li>Safety and security</li> <li>Social class/ caste</li> <li>Social and support networks</li> <li>P incl SUPPORT AND RELATIONSHIPS (who provides them) §</li> <li>Trust P</li> </ul> <b>2. Economic</b> <ul style="list-style-type: none"> <li>Education</li> <li>Employment status B</li> <li>Financial resources</li> <li>Housing availability</li> <li>Industry B</li> <li>Literacy and health literacy</li> <li>Living standard</li> <li>Occupation B</li> <li>SERVICES, SYSTEMS AND POLICIES (incl. HEALTH SERVICES, SYSTEMS AND POLICIES) §</li> </ul> |

Symbols denoting existing classifications: ± ICD § ICF (CAPITALS indicate whole ICF chapters: eg ATTITUDES), B ILO classifications; P AIHW AusWelfare framework. See Appendix C for additional information on existing classification systems that could contribute to a Determinants of Health Classification.

### 3.2 Top-level classes and working definitions

The top level classes in the Determinants of Health Classification proposed by this Project are described in this section and shown in Table 6. Working definitions for each of the top level classes are provided in the table.

Each of the four top level classes defined below is further described, together with some lower level classes, in the sections that follow.

Table 6: Determinants of Health Classification: top-level classes and working definitions

| Top-level classes                               | Working definitions  |
|---|--|
| Behavioural determinants of health              | Behaviours (activities, actions, or patterns of actions) undertaken by individuals that have the potential to influence health, including behaviours undertaken to promote, protect or maintain health, whether or not such behaviours are objectively effective towards that end (adapted from WHO 1998 'Health behaviour'). Examples include diet, tobacco use, physical activity, compliance with medical treatment, consulting with health care professionals.   |
| Biological determinants of health               | Biological, physiological, somatic <sup>8</sup> , cellular, molecular, organic and genetic affects or characteristics of the body that directly and measurably influence health. Inclusions: genetics, body functioning and systems, including markers of internal and external functioning. As risk and/or protective factors, biological determinants of health are partial, not sufficient, not always necessary, but contributing, component causes of – or strongly associated with – particular health states (eg uncontrolled hypertension and cardiovascular disease).   |
| (Physical) Environmental determinants of health | Any external agent (biological, chemical, physical – but excluding social, or cultural, which are classed with Socio-economic determinants of health) that can be causally linked to an involuntary change in health status (eg, breathing second-hand tobacco smoke would be an environmental hazard, whereas active tobacco smoking would be a behavioural determinant) (adapted from Soskolne & Sieswerda 2002).  |
| Socio-economic determinants of health           | Social and economic influences on health, broadly configured to include social, cultural, and gendered roles, among other social determinants of health described as 'the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities – the unfair and avoidable differences in health status seen within and between countries' (WHO 2009c). |

### 3.3 Behavioural determinants of health class

No existing classification systems and only one pertinent framework for structuring health-related behaviours were identified in the literature searches. Most of the studies and reviews examined focused on specific health behaviours (eg smoking, safer sex, weight loss). The single framework that we found was developed as a 'work-in-progress draft' by Gochman, the editor of a four volume handbook on health behaviour research in 1997. Gochman noted the absence of any way to organise the research, and observed that 'an encompassing taxonomic model' was vital for an organising framework (1997:416). His draft framework built on Kasl and Cobb's (1966a & b) seminal taxonomy of: health behaviour, illness behaviour, and sick-role behaviour; which Gochman enriched with the addition of 'health protective behaviours' and by distinguishing 'direct' from 'indirect risk'.

Gochman's framework has seven categories of health behaviours:

- Health cognitions;
- Care seeking;
- Risk behaviours:            Nonaddictive, and Addictive;
- Lifestyle behaviours;
- Responses to illness/ adherence; and
- Preventive, protective, safety behaviours.

Testing of Gochman's framework using lower level example terms showed that many of the categories could not be mutually exclusive. For instance, reducing salt intake could be classified as both a Lifestyle behaviour (if it was done for a general health benefit) and a Responses to illness behaviour if it was done under doctor's orders in order to reduce hypertension. The classes were progressively whittled down to the two Level 2 subclasses shown in Table 7.

<sup>8</sup> Somatic (adjective; also bodily, corporal, corporeal) – affecting or characteristic of the body as opposed to the mind or spirit, eg 'bodily needs'; 'a corporal defect'; 'corporeal suffering'; 'a somatic symptom or somatic illness'. Synonym is 'physical' (involving the body as distinguished from the mind or spirit). Antonym is 'mental' (involving the mind or an intellectual process). Source: Princeton WordNet.

Table 7: Determinants of Health Classification: Overview of Behavioural determinants class

| Top-level class                    | Level 2 subclasses                | Level 3 subclasses   |
|------------------------------------|-----------------------------------|--|
| Behavioural determinants of health | Risk and/or protective behaviours | Alcohol use<br>Breastfeeding<br>Diet<br>Dietary supplement use<br>Hygiene<br>Illicit drug use<br>Immunisation<br>Oral health behaviours<br>Pharmaceutical use<br>Physical activity<br>Protective clothing use<br>Screening behaviours<br>Seat belt use<br>Sexual activity<br>Sun exposure protective behaviours<br>Tobacco use |
|                                    | Responses to health problems      | Care seeking<br>Compliance with medical treatment<br>Health care service use behaviours<br>Pain behaviours<br>Response to illness  |

Working definitions of the level 2 classes are shown in Table 8.

Table 8: Behavioural determinants: Level 2 classes and working definitions

| Behavioural determinants of health subclasses | Working definitions   |
|---|---|
| Risk and/or protective behaviours             | Both generic and specific behaviours that have the potential to influence health, including health risk behaviours, general health-related behaviours that are directed towards keeping healthy and wellness <i>per se</i> , as well as those behaviours that are specifically adopted in reaction to or taken to guard against particular risks, diseases and/or conditions including disability and injury. Examples include tobacco use, physical activity for fitness, and use of protective clothing including headgear. Many of these behaviours are/ may be imposed in specific settings such as a workplace, school or swimming pool, while others may be imposed during specific non-health behaviours such as driving when specific driver and passenger road safety behaviours are imposed. Includes screening and immunisation. (After Gochman 1997.) |
| Responses to health problems                  | Actions undertaken to restore or maintain health in response to illness or other health problem; may be undertaken as a consequence of or consequent to a given or suspected diagnosis; and can include care-seeking, self-management, adherence to treatment regimes, and traditional medicine treatments. (After Gochman 1997.)   |

### 3.4 Biological determinants of health class

The Biological determinants of health class was difficult to organise at the higher levels and many different permutations were explored. Issues arising included the need to define what is of interest in Biological determinants of health, and to identify the boundary between biological risk/ protective factors and health conditions. For example, when does hypertension as a biological risk state become a disease? The Working Group was attracted to the principle that an entity should be described as a risk factor when it is generally treated, or treatable, by non-clinical means (eg blood pressure, impaired glucose tolerance [IGT], sun exposure). It was clear that such a boundary is not well defined. However, it was considered better to group biological risk factors together, separate from health conditions, to distinguish formally recognised health conditions from precursor conditions.

A specific example in the Australian modification of ICD, ICD-10-AM, is illustrative. IGT has been included in the Endocrine chapter (Ch IV) of ICD-10-AM. Subsequently, cases coded to IGT have been combined in statistical counts of diabetes. This is misleading. It would be preferable for IGT to be clearly shown as a risk factor for diabetes, in a separate part of the ICD.

#### Some of the options that were explored

Four major options for arranging the Biological determinants class at the highest level were explored in some detail, of which three are described below. The first was an expanded version of the traditional public health or epidemiological view of a triad formed by (Lin, Smith & Fawkes 2007:71-72, adapted from Tulchinsky & Varavikova 2000):

- the human Host (the person at risk for a specific disease);

- the Agent (the organism that is the direct cause of the disease); and
- the Environment (external factors that influence the host and their susceptibility to the agent); as well as
- the Vector that transmits or carries the agent to the host.

Biological factors, however, are scattered through each of the elements, making this less than useful as an organising framework for our purposes.

The second was an arrangement proposed by Bortz (2005:389) after dismissing the ‘old public health rubric’: host, agent, and environment as an ‘impoverished scheme’ lacking representation of the newer contributions of genetics and aging to ‘phenotypic health’. The following arrangement was proposed as being composed of ‘more operationally helpful’ determinants that describe the biological experience of organisms (Bortz 2005:391):

- Genes;
- External agency (adverse encounter with a hostile threat, eg injury, infection, and malignancy, acute in their representation and usually confined to a defect in a component part of the body);
- Internal agency (disordered internal function, eg chronic illness patterns, that tend to involve the entire system rather than components as in external agency problems); and
- Ageing (‘wear and tear minus repair’).

Bortz metaphorically compares his proposed schema to the life of a car, which depends on four elements: design, accidents, maintenance, and ageing; claiming that these four factors can account for the totality of the human health experience, can occur in innumerable combinations and chronologies, both individually and collectively, and differentiate intractable areas from those that can be influenced or controlled, although only those determinants caused by faulty external and internal agency are *currently* susceptible to clinical intervention.

The Working Group considered the schema but perceived it as too focused on ageing, and did not find the internal/external agency split useful. There were also questions about how to relate it to biological risk factors such as overweight and obesity.

Among other options considered was an arrangement of:

- Genetics,
- Body function and structure,
- Body growth and development, and
- Ageing and senescence.

Body function (eg blood pressure function, which was noted as having impairments to it classified in the ICF), and body structure were perceived as different areas, while genetics was considered quite distinct. Growth and development were considered to be important as they lead to the phenotype as an expression of both genes and environment.<sup>9</sup> It was noted that there was occasional overlap with the ICF and the ICF-CY for children and youth, which includes developmental topics. Anthropometric measures were, however, missing from the ICF (eg height and weight).

Grouping of biological determinants was also attempted on the basis of whether they were a function of relationships with the internal or external environment, for example, bodily interaction with the external environment, such as the ability to see, hear, and move about; versus the internal bodily interactions captured by measures of biochemical process or function. This distinction has been operationalised to some extent in the proposed arrangement of the lower levels of the Body functioning class.

Lower level classes that might be contained in this class include those (objectively) ‘measurable’ biomedical risk state markers identified in health measurement surveys. These can include, for example, anthropometric measures (eg height, weight, abdominal circumference) and physiological measures (eg blood pressure, lung function measured by spirometry) with or without self-reported ‘measures’ (eg hereditary conditions; tobacco exposure [self smoking, parental smoking, tobacco smoke exposure at work, etc.]; alcohol intake; and life-course SES: measures such as reported birth weight; among others [PHIDU 2002]).<sup>10</sup>

Biological risks identified as determinants of health are likely to differ in different societies, cultures, countries or areas of the world and at different times. The *2002 World Health*

9 A continuum of diseases and conditions ranges from those that are entirely genetic (eg Huntington’s Disease) through those that are the product of the intersection of genetics and environment (eg obesity [see, for instance, Wells 2006]) to those that are entirely environmental (eg struck by lightning).

10 These were drawn from the proposed core content for the Australian Health Measurement Survey, in: PHIDU 2002. *A proposal for the Australian Health Measurement Survey Program*. Adelaide: PHIDU. See Appendix A for more details.

Report's leading risk factors for world regions stratified by child mortality include several biological factors (eg underweight, zinc deficiency, blood pressure; see Figure 5) (WHO 2002a). Sources such as health measurement surveys in other countries could be reviewed to build a more inclusive list. For instance, the US National Health and Nutrition Examination Survey (NHANES) examination component consists of medical, dental, and physiological measurements (Audiometry, Balance, Bioelectrical impedance analysis, Body measurements, CV fitness, Dermatology, Dietary, etc.) as well as laboratory tests (for/ of: Acrylamide, Albumin (urine), Apolipoprotein (B), Arsenic (urine), Bone alkaline phosphatase, etc.) while the questionnaire component includes: Acculturation, Allergy, Audiometry, Balance, Blood pressure, etc (US CDC 2009).<sup>11</sup>

The higher level classes proposed for the Biological determinants of health class are shown in Table 9.

Working definitions of the level 2 and 3 subclasses are shown in Table 10.

Table 9: Determinants of Health Classification: overview of Biological determinants class

| Top-level class                   | Level 2 subclasses      | Level 3 subclasses       |
|-----------------------------------|-------------------------|--------------------------|
| Biological determinants of health | Genetic                 | Single-gene              |
|                                   |                         | Chromosomal              |
|                                   |                         | Multifactorial           |
|                                   |                         | Mitochondrial DNA-linked |
|                                   | Body structure          | Height                   |
|                                   |                         | Weight                   |
|                                   |                         | Waist-hip ratio          |
|                                   |                         | Bone density             |
|                                   | Body functioning        | Blood pressure           |
|                                   |                         | Nutritional status       |
|                                   |                         | Biochemical function     |
|                                   |                         | Sensory function         |
|                                   |                         | Movement and balance     |
|                                   | Strength and robustness |                          |
|                                   | Fitness                 |                          |

Table 10: Biological determinants: level 2 and 3 classes and working definitions

| Biological determinants of health subclasses | Working definitions   |
|--|---|
| <b>Genetic</b>                               | Affects or characteristics of the body that are genetic in origin or have a genetic component that may directly and measurably determine health and/or disability (eg familial hypertension increases individual propensity for hypertension; inheritance of the BrCa1 gene increases individual susceptibility to breast and ovarian cancer; genetic causes of birth defects/ congenital abnormalities). Almost all diseases have a genetic component. However, the importance of that component varies. Disorders in which genes play an important role (genetic diseases) can be classified as (adapted from A.D.A.M. [2009]):   |
| Single-gene                                  | A single gene disorder (also called Mendelian disorder) is caused by a defect in one particular gene. Single gene defects are rare. But since there are about 18,000 known single gene disorders, their combined impact is significant. Single-gene disorders are characterised by how they are passed down in families. There are six basic patterns of single gene inheritance: autosomal dominant, autosomal recessive, X-linked dominant, X-linked recessive, Y-linked inheritance, and maternal (mitochondrial) inheritance. The observed effect of a gene (the appearance of a disorder) is called the phenotype. People with one copy of a recessive disease gene are called carriers. Carriers usually don't show the disease. However, the gene can often be found by sensitive laboratory tests. [Some] examples of single gene disorders include: cystic fibrosis, phenylketonuria, sickle cell anaemia, haemophilia A, familial hypercholesterolemia, and Huntington's disease. |
| Chromosomal                                  | In chromosomal disorders, the defect is due to an excess or lack of the genes contained in a whole chromosome or chromosome segment. Chromosomal disorders include: Down syndrome, Klinefelter syndrome, and Turner syndrome.   |
| Multifactorial                               | Many of the most common diseases involve interactions of several genes and the environment (for example, illnesses in the mother and medications). These include: cancer, coronary heart disease, hypertension, and stroke.   |

Table continues over the page

11 Risk factors, defined as 'those aspects of a person's lifestyle, constitution, heredity, or environment that may increase the chances of developing a certain disease or condition', will also be examined in forthcoming NHANES, including: smoking, alcohol consumption, sexual practices, drug use, physical fitness and activity, weight, and dietary intakes as well as data on some aspects of reproductive health (eg use of oral contraceptives, breastfeeding practices).

Table 10: Biological determinants: level 2 and 3 classes and working definitions *continued*

| Biological determinants of health subclasses | Working definitions   |
|--|---|
| Mitochondrial DNA-linked                     | Mitochondria are small organisms found in most of the body's cells. They are responsible for energy production inside cells. Mitochondria contain their own private DNA. In recent years, more than 60 hereditary disorders have been shown to result from changes (mutations) in mitochondrial DNA. Because mitochondria come only from the female egg, most mitochondria-related disorders are passed down only from the mother. Mitochondrial disorders can appear at any age. They have a wide variety of symptoms and signs. These disorders may cause: blindness, developmental delay, gastrointestinal problems, hearing loss, heart rhythm problems, metabolic disturbances, and short stature. |
| <b>Body structure</b>                        | Affects or characteristics of body structure that may be protective or risk factor determinants of health; they may be causally related or strongly associated with the propensity for health or for disease, disability, or injury. Body structures are particular complex anatomical parts of living beings; an example is 'bone structure'. (adapted from Princeton WordNet).  |
| Height                                       | Measured body height. One of the anthropometrical measures used to assess a person's relationship to the standards for growth and development (eg using growth tables); and one of two measures required to calculate body mass index (BMI).  |
| Weight                                       | Measured body weight. One of the anthropometrical measures used to assess a person's relationship to the standards for birthweight, growth and development (eg using growth tables); and one of the measures required to calculate BMI.   |
| Waist-hip ratio                              | Ratio of the measured circumference of the waist to that of the hips; a way of approximating abdominal fat, regarded as a better predictor of health risk than BMI.   |
| Bone density                                 | Measured bone mass in relation to bone volume; used to determine the risk of developing osteoporosis.   |
| <b>Body functioning</b>                      | Affects or characteristics of body functioning that may be protective or risk factor determinants of health; they may be causally related or strongly associated with the propensity for health or for disease, disability, or injury.<br>Body functions (or processes) are organic processes that take place in the body; an example is 'respiratory activity'. (adapted from Princeton WordNet).  |
| Biochemical <sup>12</sup> function           | Presence and/or functional status of various biochemicals and/or biochemical reactions. Includes measured presence or absence of biochemicals required for particular functions (eg absence of the enzyme lactase leads to lactose intolerance – inability to metabolize lactose, a sugar found in dairy products; high blood of cholesterol levels associated with atheroma, and also gall stones); and the status of chemical processes involving biological functions (eg lipid function, thyroid function).   |
| Blood pressure                               | Measured blood pressure to determine whether a person's blood pressure is high or low for age, with corresponding health consequences if unmanaged.   |
| Movement and balance                         | Assessed or measured movement (agility, flexibility) and balance abilities.   |
| Nutritional status                           | Assessed nutritional status (standing or condition) measured at a point in time, which determines whether a person is malnourished, well nourished, or over-nourished, for example.   |
| Respiratory function                         | Measured lung function assesses how well the lungs take in and exhale air and how efficiently they transfer oxygen into the blood (adapted from ELF 2010).  |
| Sensory function                             | Assessed or measured function of the sensory mechanisms of hearing, sight, smell, taste and touch. Sensory deficits are associated with various risks to health.  |
| Strength and robustness                      | Assessed or measured bodily strength and robustness (eg upper body strength, frailty).  |
| Fitness                                      | Assessed or measured physical fitness or condition (eg aerobic fitness measures how well blood transports oxygen and how well muscles use oxygen).  |

### 3.5 (Physical) Environmental determinants of health class

Environmental determinants of health can be near or far, in time and space (latent, proximal or distal); and can include social as well as physical conditions and combinations of both.

12 'Biochemical refers to the chemical reactions that occur within a living organism, such as the breakdown or manufacture of biological molecules by enzymes' (NASA 2004. Science Glossary. Available at: <spaceflight.nasa.gov/history/shuttle-mir/references/glossaries/science/sc-gloss-a\_f.htm> accessed 23 February 2010).  
Biochemistry is 'the organic chemistry of compounds and processes occurring in organisms; the effort to understand biology within the context of chemistry' (Princeton WordNet).

Issues include the need to define what is of interest in environmental determinants, for example, it should be human exposures that are captured rather than facts about the environment, unless these are a part of identifying an exposure (eg the type of drinking water available and thus consumed). Most environmental frameworks identify risk only rather than risk *and* protective determinants of health. Many have been prepared for the specific purpose of risk analysis (eg environmental health impact assessment of systemic risks: Briggs 2008). There may be a need to define the boundary between risk to the human environment *per se* (eg climate change), and what can be usefully collected as a *prima facie*

hazardous or detrimental human exposure (eg exposure to extreme heat). Another issue is the division between the (Physical) Environmental and the Socio-economic determinants of health classes. At issue is whether the division shown here is appropriate, realistic and usefully able to be operationalised.

The Working Group recognised the very different concerns of the developed and developing worlds. For instance, developed world concerns include gene-environment, and environment-environment interactions; particulate air pollution, nitrogen dioxide, ozone, environmental tobacco smoke; radiation, lead, the impact of electronic technology (eg computers, mobile telephones), endocrine disrupting persistent organic pollutants, and the health affects of urban environments (Soskolne & Sieswerda 2002; Galea, Freudenberg & Vlahov 2005). Exposures to these 'environmental vectors' are described as 'downstream or proximate' determinants of health as the effects of most exposures are relatively close in time and space; and both health and well-being are affected.

Environmental determinants of concern in the developing world include the biological agents in air, water, and soil that most deaths are attributed to, including diarrhoeal diseases transmitted by contaminated food or water, malaria transmitted by mosquitoes, intestinal parasitic infestations, respiratory diseases caused by air pollutants in indoor and

outdoor environments, and poverty-related lack of the basic needs: adequate food, safe water, and shelter. These environmental hazards take a far greater toll in absolute terms than those of concern to the developed world (Soskolne & Sieswerda 2002). These sets of concerns are not mutually exclusive. There are pockets of populations in the developed world that remain impacted by the primary environmental determinants that most affect the developing world (eg some remote Australian Indigenous communities lack clean water, adequate shelter and food); while the developing world has also been affected by environmental determinants of most concern in the developed world, such as those related to the rise of chronic diseases and associated risk factors and the growth of urbanisation (WHO 2002a; Ezzati et al. 2004; Lopez et al. 2006) (Figure 5).

The classes shown in Table 11 have been largely adapted from Kingsland (2006)<sup>13</sup> excluding some of the more environment-level topics (eg harmful algal blooms, vector-borne disease). Kingsland draws on a number of prior works, many of which were among those examined for this Project (Briggs 2003, 2008; Centers for Disease Control and Prevention 2009; Commonwealth of Australia 1994; Corvalán, Briggs & Kjellstrom 1996; Thacker et al. 1996; Brownson, Haire-Joshu & Luke 2006; Ebi et al. 2006; Evans 2003; Northridge, Sclar & Biswas 2003; Stillerman et al. 2008; Vickers & Lease 2008; von Schirnding 2002; Wigle et al. 2008; WHO 1997).

Figure 5: Leading risk factors as percentage causes of disease burden (in DALYs)

| Developing countries:<br>High mortality countries | %    | Developing countries:<br>Low mortality countries | %   | Developed countries            | %    |
|---|------|--|-----|--------------------------------|------|
| Underweight                                       | 14.9 | Alcohol  | 6.2 | Tobacco                        | 12.2 |
| Unsafe sex  | 10.2 | Blood pressure                                   | 5.0 | Blood pressure                 | 10.9 |
| Unsafe water, sanitation and hygiene              | 5.5  | Tobacco  | 4.0 | Alcohol                        | 9.2  |
| Indoor smoke from solid fuels                     | 3.7  | Underweight                                      | 3.1 | Cholesterol                    | 7.6  |
| Zinc deficiency                                   | 3.2  | Overweight                                       | 2.7 | Overweight                     | 7.4  |
| Iron deficiency                                   | 3.1  | Cholesterol                                      | 2.1 | Low fruit and vegetable intake | 3.9  |
| Vitamin A deficiency                              | 3.0  | Indoor smoke from solid fuels                    | 1.9 | Physical inactivity            | 3.3  |
| Blood pressure                                    | 2.5  | Low fruit and vegetable intake                   | 1.9 | Illicit drugs                  | 1.8  |
| Tobacco   | 2.0  | Iron deficiency                                  | 1.8 | Unsafe sex                     | 0.8  |
| Cholesterol                                       | 1.9  | Unsafe water, sanitation and hygiene             | 1.7 | Iron deficiency                | 0.7  |

Source: WHO 2002. *The World Health Report 2002*. Geneva: WHO. Note: DALYs = Disability-adjusted life years: a measure of overall disease burden; public health metric of healthy life years lost to disease due to both morbidity and mortality, adjusted for disability (World Bank, WHO).

13 Note however that the purpose of Kingsland's work was to develop a framework for indicators for environmental health surveillance.

Table 11: Determinants of Health Classification: overview of (Physical) Environmental determinants class

| Top-level class                                 | Level 2 subclasses                 | Level 3 subclasses                    |
|---|------------------------------------|---------------------------------------|
| (Physical) Environmental determinants of health | Water quality                      | Drinking water quality                |
|   |                                    | Recreational water quality            |
|   |                                    | Recycled water quality                |
|   | Air quality                        | Ambient air quality                   |
|   |                                    | Indoor air quality                    |
|   | (Effects of) Climate and geography | Solar radiation                       |
|   |                                    | Temperature                           |
|   |                                    | Rainfall                              |
|   |                                    | Fire                                  |
|   |                                    | Severe weather events                 |
|   |                                    | Salinity                              |
|   |                                    | Sea level rise                        |
|   | Built environment                  | Transport [eg road traffic accidents] |
|   |                                    | Public open space                     |
|   |                                    | Noise                                 |
|   |                                    | Biological hazards                    |
|   |                                    | Material hazards [eg asbestos, lead]  |
|   |                                    | Housing quality                       |
|   |                                    | Chemical hazards                      |
|   |                                    | Radiological hazards                  |
|   |                                    | Electromagnetic hazards               |
|   |                                    | Food safety                           |
|   | Quality                            |                                       |
| Land and soil quality                           | Contamination                      |                                       |
|   | Pesticides                         |                                       |

Note: Definitions for some additional lower level terms are in the Glossary.

Working definitions of the level 2 subclasses are shown in Table 12.

Table 12: (Physical) Environmental determinants: level 2 classes and working definitions

| (Physical) Environmental determinants of health subclasses | Working definitions   |
|--|---|
| Water quality  | The quality and safety of water for human use.  |
| Air quality  | The quality and safety of air which humans breathe.   |
| (Effects of) Climate and geography                         | Effects of climate and geography on health, including changes in climate and geography, such as extremes of temperature (eg deaths due to heat stress). Other examples include skin cancer caused by over-exposure to solar radiation, burns suffered by bushfire victims, unhealthy living conditions created by sea level rise. |
| Built environment  | The quality and safety of the built environment in which humans live.   |
| Food safety  | The quality and safety of the food and drink (excepting water) that humans consume.   |
| Land and soil quality                                      | The quality and safety of the land environments on which humans live and depend.  |



### 3.6 Socio-economic determinants of health class

The Working Group acknowledges that the Socio-economic determinants of health class needs more work. The boundary between Socio-economic and (Physical) Environmental determinants of health is not always clear (refer to discussion in section 3.5).

In addition, some of the determinants shown below are environmental or ecological while others are attributes of the individual. For example, both the education system – a part of SERVICES, SYSTEMS AND POLICIES – as well as Education as in individual educational attainment are included as determinants of health. Separating the ecological from the individual requires addressing the problem of ‘levels’ referred to and briefly discussed in Appendix B.

It was notable that the majority of work on Socio-economic determinants of health relates to those that are variously described as ‘proximal’ or ‘downstream’ (near) in relation to individual persons, rather than ‘upstream’ or ‘distal’ (far). The latter include those that relate to the overall systems within which people live. For example, some conceptualisations exempt the health system as a determinant of health (AIHW 2008).<sup>14</sup> The definition of determinants of health adopted by this Project, however, explicitly includes the impact of the health system on health (see section 1.2.1). The Project has, accordingly, included a chapter from the ICF: Environmental Factors section that encompasses ‘Health services, systems and policies’ among other ‘Services, systems and policies’ (WHO 2001:192, 203).

The higher level classes proposed for the Socio-economic determinants of health class are shown in Table 13.

Table 13: Determinants of Health Classification: overview of Socio-economic determinants class

| Top-level class                       | Level 2 subclasses | Level 3 subclasses   |
|---------------------------------------|--------------------|--|
| Socio-economic determinants of health | Social             | ATTITUDES (who holds them) §<br>Community involvement, civic engagement, bridging social capital ▶<br>Culture<br>Ethnicity<br>Gender <sup>15</sup><br>Health cognition<br>Language<br>Religious belief or spirituality<br>Safety and security<br>** Armed conflict & war<br>** Crime & violence<br>Social class/ caste<br>Social and support networks ▶ including SUPPORT AND RELATIONSHIPS (who provides them) §<br>Trust ▶ |
|                                       | Economics          | Education<br>Employment status ▶<br>Financial resources<br>** Financial stress<br>** Income<br>** Wealth<br>** Ability to pay for health care<br>** Insurance coverage<br>Industry ▶<br>Literacy and health literacy<br>Living standard<br>Occupation ▶<br>SERVICES, SYSTEMS AND POLICIES (incl. HEALTH SERVICES, SYSTEMS AND POLICIES) §  |

Symbols denoting existing classifications: § ICF (CAPITALS indicate whole ICF chapters: eg ATTITUDES), ▶ ILO classifications; ▶ AIHW AusWelfare framework.

<sup>15</sup> Gender

14 The glossary to *Australia’s health 2008* (AIHW 2008) defines a determinant as ‘Any factor that can increase the chances of ill health (risk factors) or good health (protective factors) in a population or individual’ but asserts that ‘By convention, services or other programs which aim to improve health are often not included in this definition’ (AIHW 2008: Glossary: ‘determinant’).

15 The term ‘gender’ describes those characteristics of women and men, boys and girls, which are socially constructed, while the term ‘sex’ refers to those that are biologically determined. People are born female or male but learn to be girls and boys who grow into women and men, and it is this learned behaviour that makes up gender identity and determines gender roles (WHO 2002c).

The Working Group proposes that the whole of some chapters from the ICF: Environmental Factors section be adopted into a Determinants of Health Classification. These whole chapters are (as indicated in CAPITALS in Table 13):

- ATTITUDES (who holds them);
- SUPPORT AND RELATIONSHIPS (who provides them); and
- SERVICES, SYSTEMS AND POLICIES (including the health system, health services and health policies).

Appendix D details the structure of these chapters as well as other chapters in the Environmental Factors section of the ICF that could contribute to a Determinants of Health Classification (WHO 2001). For definitions please refer to the online ICF Browser at :  
<<http://apps.who.int/classifications/icfbrowser/>> (WHO 2009).

Working definitions of the level 2 Socio-economic determinants of health classes are shown in Table 14. Note that the Glossary (page 34) includes definitions for some lower level terms.

Table 14: Socio-economic determinants: level 2 classes and working definitions

| Socio-economic determinants of health subclasses | Working definitions  |
|--|--|
| Social   | Social determinants that influence health, including social, cultural, and gendered roles, religious belief or spirituality, health cognition; and other societal contributors such as social attitudes, class/ caste systems, community involvement and social and support systems.   |
| Economic   | Economic determinants that influence health, including education, literacy and health literacy; employment status, occupation and industry; living standard, financial resources; and the services, systems and policies that are provided by or govern societies and states including the health system, services and policies. |

### 3.7 Issues for further consideration

A number of issues that arose during the course of the Project and that have been briefly explored in their contexts in this report are summarised in Table 15. The Working Group considered that these issues required more

deliberation than was possible given the Project constraints, and has thus highlighted these issues as areas for discussion and further work.

Table 15: Determinants of Health Classification: Summary of issues for further consideration

|   |  |
|---|--|
| Top-level classes                             | <ul style="list-style-type: none"> <li>■ Is there agreement on the top-level classes?</li> <li>■ Are the differences between the classes clear and useful?</li> <li>■ Are all important determinants captured?</li> </ul>  |
| Biological determinants                       | <ul style="list-style-type: none"> <li>■ Is the top level classification of the Biological determinants appropriate?</li> <li>■ Are all important determinants captured?</li> <li>■ Should clinically treated – or treatable – determinants be classified by ICD while those that are not treated – or non-treatable – are classified as determinants of health?</li> <li>■ When is blood pressure or hypertension a Determinant of Health and when is it a condition or disease that should be classified by ICD? For example, well-managed hypertensives no longer produce high blood pressure readings.</li> <li>■ When are body dysfunctions determinants of health and when are they dimensions of health or health status? For example, a touch dysfunction could be a risk factor for burns, but is it (also?) a health status indicator in its own right?</li> </ul> |
| Environmental and Socio-economic determinants | <ul style="list-style-type: none"> <li>■ Is the division between (Physical) Environmental and Socio-economic determinants appropriate?</li> <li>■ Are all important determinants captured?</li> <li>■ How can the difference between ecological and individual attributes be better handled?</li> </ul>  |
| Other issues                                  | <ul style="list-style-type: none"> <li>■ Where should multi-system or multi-class determinants be placed, eg Stress, Psychosocial determinants such as Mood and Traumatic exposure?</li> <li>■ Is it necessary for top-level or lower level classes to be mutually exclusive?</li> </ul>   |

It is hoped that readers will find this report a useful contribution to a major topic deserving of development and intellectual investment. The Working Group commends the report to interested parties for their consideration and further contributions.

# Alternative definitions of 'determinants of health'

## WORLD HEALTH ORGANIZATION

**Determinants of health:** 'The range of personal, social, economic and environmental factors that determine the health status of individuals or populations.'

**Source:** WHO 1998. Health promotion glossary. Geneva: WHO, p. 6.

**Determinants of health:** 'Factors that influence health status and determine health differentials or health inequalities. They include, for example, natural, biological factors, such as age, sex and ethnicity; behaviour and lifestyles, such as smoking, alcohol consumption, diet and physical activity; the physical and social environment, including housing quality, the workplace and the wider urban and rural environment; and access to health care'.<sup>16</sup>

**Source:** WHO 2005. Health impact assessment (HIA): Glossary of terms used. Geneva: WHO; citing Lalonde 1974; Labonté 1993.

'The **social determinants of health** are the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities – the unfair and avoidable differences in health status seen within and between countries.'

**Source:** WHO 2009c. Social determinants of health [website].

## AUSTRALIAN

'**Determinants of health**' is a term used for factors that affect health at the individual or population level... they are the key to the prevention of disease and injury and help

<sup>16</sup> This was the working definition used in the Public Health Classifications Project: Phase One, and the starting definition for this Project, modified slightly by removing 'lifestyles' from the phrase 'behaviour and lifestyles' to avoid the 'personal choice' and 'victim blaming' connotations aggregating around this term (Kelly et al 2008). Note that as 'lifestyles' were not referred to in lower level classes the use of this term appeared unwarranted at the top level.

explain and predict trends and inequalities in health.

They can be environmental, socioeconomic, behavioural and biomedical, and can act more directly to cause disease (such as tobacco smoking) or be further back in the causal chain and act via a number of intermediary causes (such as socioeconomic status). Individuals have a degree of control over some determinants (such as physical inactivity), but other determinants act mainly or entirely at a population level (such as the fluoridation of drinking water).

**Source:** AIHW 2008. Australia's health 2008. Canberra: AIHW, p. 463.

**Determinant:** Any factor that can increase the chances of ill health (risk factors) or good health (protective factors) in a population or individual.

**Source:** AIHW 2008. Australia's health 2008. Canberra: AIHW, Glossary.

## CANADIAN

**Health determinants** are those factors interacting to influence health. *Strategies for population health* lists nine health determinants: income and social status; social support networks; education; employment and working conditions; physical environment; biology and genetic endowment; personal health practices and coping skills; healthy child development; and health services. Gender and culture were later added.

**Sources:** Health Canada 1994. Strategies for population health; and [Canadian] Federal, Provincial & Territorial Advisory Committee on Population Health 1996. Report on the health of Canadians; both published Ottawa, Ontario: Minister of Supply and Services Canada.

## CANADIAN & US RESEARCHERS

**Patterns of health determinants over the life course:** 'the multiple determinants of... health outcomes... include medical care, public health interventions, aspects of the social environment (income, education, employment, social support, culture) and of the physical environment (urban design, clean air and water), genetics, and individual

behaviour. We note with caution that such a list of categories can lead to a view that they operate independently; population health research is fundamentally concerned about the interactions between them, and we prefer to refer to 'patterns' of determinants'.

**Source:** Kindig & Stoddart 2003. American Journal of Public Health, p. 381.

## EUROPEAN

**Determinants of health.** These are factors that influence health positively or negatively.

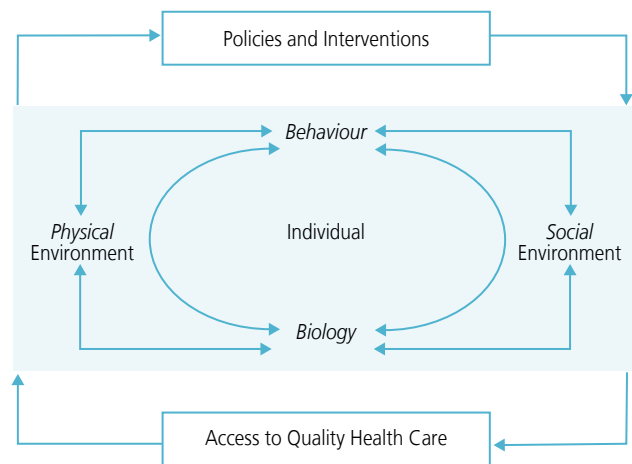
**Determinants of social inequities in health.** These are social, economic and lifestyle-related determinants of health that increase or decrease social inequities in health.

**Source:** Dahlgren & Whitehead 2007. European strategies for tackling social inequities in health. Copenhagen: WHO Regional Office for Europe, p. 7; adopted by WHO Regional Office for Europe 2009.

## UNITED STATES

**Determinants of health:** Individual biology and behavior, physical and social environments, policies and interventions, and access to quality health care – have a profound effect on the health of individuals, communities and the Nation.

Figure 6: Determinants of health (US DHHS 2000. Healthy People 2010)



Source: US DHHS 2008. Phase I Report: Recommendations for the framework and format of Healthy People 2020: Glossary [website]; citing US DHHS. Healthy People 2010.

# Alternative 'determinants of health' frameworks

## There is a wealth of determinants of health frameworks

There are many (and many competing) determinants of health frameworks available, a large number of which were reviewed during the course of this Project. They range from the early works by the Canadians (CIHI & Statistics Canada 2000; CIHI 2008) and others, generalised in the framework produced by the International Organization for Standardization (2001), to the later work of the UK National Institute for Clinical Excellence (Kelly et al. 2008) and various researchers (eg Krieger 2008). Pérez-Stable (2008) has compiled a useful collection of conceptual determinants of health frameworks in three major categories and for various purposes, including for the operationalisation of research.

One of the most recent frameworks is that on the social determinants of health (and related work) put out by the WHO's Commission on Social Determinants of Health (CSDH), which marshals a wealth of evidence and arguments into a comprehensive picture (Irwin et al. 2006; CSDH 2007, 2009). The CSDH framework, while wide-ranging, lacks useful lower levels and could not be operationalised within the constraints of this Project.

Other conceptualisations offer even more complexity (Krieger 2008) or deceptive simplicity (Kelly et al. 2008). Related work has attempted to operationalise determinants of health frameworks in suites of indicators for routine reporting (CIHI 2008, US DHHS 2000). Most are, however, lacking in framework development at lower levels and this is the space in which this Project has worked and hopes to offer a starting point.

## Levels

Most of the frameworks examined conflate the determinants of health of individual persons or cases with those of groups or do not distinguish between the two in a manner that can be operationalised. It was clear that the 'problem' (or confusion) of 'levels' (Krieger 2008) is pervasive, difficult to address and discuss, and rarely spelled out. (We have

made an attempt in the use cases in section 1.2.4.) Lin and colleagues (2003) tested a large number of international indicator suites in relation to gender, health and equity reporting and found a need for various additional levels of reporting including the household and intra-household levels.

An even greater plethora of determinants of health frameworks address – frequently multilevel – determinants of particular health-related conditions (eg determinants of kidney disease: Shoham, Vupputuri & Kshirsagar 2005; cancer: Hiatt & Breen 2008; asthma: Wright & Subramanian 2007; obesity: Newell et al. 2007; oral health: Nicolau et al. 2007; and perinatal health: Misra, Guyer & Allston 2003; among others). As many again take particular situations and tease out the determinants consequent on those situations (eg consequences of urban living: Galea, Freudenberg & Vlahov 2005; built environments: Northridge, Sclar & Biswas 2003; childhood disadvantage: Graham & Power 2004; and public health consequences of armed conflict: Furst et al. 2009; among others).

In relation to the growing sophistication and complexity of many determinants of health frameworks, there is a developing body of research on multi-level, multi-causal, and/or multi-factorial determinants and conditions (eg multi-factorial diseases: Stolk et al. 2008). Kelly and colleagues (2008) use a concrete example to illustrate how social and population vectors acting in tandem with environmental and organisational vectors account for the patterning of disease:

heart attack is a biological event, but build-up of atherosclerosis is a result of diet and behaviours linked to social position; when heart attack occurs, emergency response time will be critical in whether death is the endpoint.

Recent work delving into the genetic (partial/ whole) causes of disease and disorders has added complexity to the biological determinants of health area (see, for example, Lemberger 2007; Loscalzo, Kohane & Barabasi 2007).

Still largely missing, however, are the well developed mid and lower level frameworks that would enable the (mutually exclusive) organisation of what threaten to be enormous lists of determinants into meaningful structures that might be compared over time, between areas, and by 'treatment'/ intervention modes. This is one of the gaps that this project has addressed.

## **Burden of Disease work**

Burden of Disease (BoD) studies have, since the first was undertaken in 1996, attempted to quantify the relative proportions of mortality, illness and disability deriving from or attributable to not only diseases but also risk factors for diseases and health-related states (Murray et al. 2001; Ezzati et al. 2004; Lopez et al. 2006). Lists of the top risk factors for each of three mortality strata (the countries of the world peer-grouped according to differing patterns of infant and adult mortality) were presented in the WHO's *2002 World health report* based on the Global BoD study (Lopez et al. 2006) (see Figure 5 on page 21). These lists are, however, unstructured by determinant types, and it is also hoped that the results of this project may contribute some structure to further presentations of this type, for instance, to identify the top environmental, behavioural, biological and socio-economic risks relevant to peer grouped countries.

## **Opportunity presented by the revision of the ICD**

Various reviews have identified that there are a variety of ICD classes that refer to determinants of health (rather than to diseases or health conditions) but that they are not well organised and are in need of revision (eg Madden 2008). With the ICD-11 revision underway, it was thought that this Project could contribute to this previously identified need.

## **Summary**

Although there are many general and specific high level determinants of health frameworks available there is a lack of frameworks offering conceptual guidance at the next levels down. This Project addresses and offers structure within these lower levels.

# Existing classification systems that could contribute to a Determinants of Health Classification

As part of the Project a scan of existing classification systems was made to determine those that could contribute to a Determinants of Health Classification. Those identified and the axes or classes of relevance are in Table 16.

The majority have been assessed as of most relevance to the Socio-economic and/or Working conditions areas. Axes/classes are listed alphabetically and include those that were in existence as at May 2009.

Table 16: Determinants of Health Classification: existing classification systems that could contribute

| Subclasses                        | Underlying classification system/s | Other systems of relevance  | Coverage   |
|-----------------------------------|------------------------------------|---|--|
| Behavioural determinants          | None.                              | Health behaviours classified for purposes of organising health behaviour research by Gochman (1997).  | Coverage seems reasonable; however categories are not mutually exclusive.  |
| Biological determinants           |                                    | ICD   | Coverage posited as restricted to those biological risks that are clinically 'measurable & treatable'.   |
|                                   |                                    | ICF   | Body: function & structure; growth & development. Concept correspondence is variable.  |
| Environmental determinants        |                                    | ICF   | At least partial coverage of 'neutralised' concepts (eg air, water, soil, noise). Lacks DoH focus.   |
|                                   |                                    | DPSEEA – Driving force, Pressure, State, Exposure, Effect, Action Framework (Corvalán et al. 1996), multi-axial like ICECI, DPSEEA &/ or derivatives used by WHO, OECD, others. | Coverage goes beyond what is required for DoH & major focus is on PH response to identified problems. Lacks a conceptual framework for 'problems' (DoH).             |
|                                   |                                    | GHS – The Globally Harmonized System for the Classification and Labelling of Chemicals (UNECE 2009)   | Chemicals only.  |
|                                   |                                    | DCP – Disability Creation Process (Quebec classification, P Fougeyrollas)   | Similar to ICF, has an environmental axis, integrated whole (states: 'do not use elements in isolation'), partial coverage.  |
|                                   |                                    | CPC – Central Product Classification (UNSD 2008)  | At least partial. Query relationship of ICF to CPC, eg CPC Ver.2 code 18: Section: 1 – Ores and minerals; electricity, gas and water * Division: 18 – Natural water. |
| Health system determinants        |                                    | Health System Performance Frameworks (Australia – tier 3; Canada has similar; ISO (2001) has proposed a generic framework; how many countries have cover?)                      | Depends on what is in 'bottom-up' elements.  |
|                                   |                                    | ICF – Health services, systems & policies: further breakdown into Health services, Health systems; Health policies; Other & NES.  | ICF classification is a high level beginning, lacks DoH focus.   |
| Household determinants            | None.                              | ICF   | Family – not nec. household – members (eg immediate/ extended family); some household tasks. Lacks DoH focus.  |
| Living conditions                 |                                    | ASGC – Australian Standard Geographical Classification (ABS) – area of residence  | Area of residence only.  |
|                                   |                                    | ICF   | Some elements only, lacks DoH focus.   |
| Psychosocial determinants         |                                    | ? ICF   | ? eg support: some classification of societal members. Lacks DoH focus.  |
| Social and community determinants |                                    | ICF – social support etc.   | Some elements only (eg support, attitudes); some classification of societal members.   |

Table continues over the page

Table 16: Determinants of Health Classification: existing classification systems that could contribute *continued*

| Subclasses  | Underlying classification system/s  | Other systems of relevance  | Coverage   |
|---|---|---|--|
| Socio-economic determinants<br><i>See Working conditions for other specific classifications</i> | National statistics standards – most countries would have similar classification standards.         | ABS standards for coding person-level characteristics: income, ethnicity, etc. in Australia.                        | At least partial in Australia, depending on 'bottom-up' elements.                    |
|   | ISCED – International Standard Classification of Education (UNESCO)                                 | ABS standards for coding education level.   | Most countries would have similar classification standards.                          |
|   |   | ICF provides a classification for underlying social/ economic systems, services & policies.                         | Apart from Systems, services & policies, some elements only (eg support, attitudes). |
| Working conditions  | ISIC - International Standard Industrial Classification of all Economic Activities                  | ANZSIC – Industries   | Industries/ industry areas only – country cover good.                                |
|   | ISCO – International Standard Classification of Occupations (ILO)                                   | ASCO – Occupations  | Occupations only, but country cover appears good.                                    |
|   | ICSE – International Classification of Status in Employment (ILO)                                   | ABS – Labour Force  | Probably similar for most countries.   |
|   | Classifications of occupational injuries (ILO)  | ICD & ICECI International Classification of External Causes of Injury (WHO) – work injuries and hazardous exposures | Occupational injuries and exposures to hazards.                                      |
|   | GHS – The Globally Harmonized System for the Classification and Labelling of Chemicals (UNECE 2009) |   | Chemicals - hazardous exposures.   |



# *International classification of functioning, disability and health (ICF) chapters from section E: Environmental Factors that could contribute to a Determinants of Health Classification (WHO 2001, 2009)*

This appendix consists of section E: Environmental Factors, and its lower level chapters, from the International classification of functioning, disability and health (ICF), that could contribute to a Determinants of Health Classification (WHO 2001, 2009).

## **E: Environmental Factors**

The overall shape of the section is divided into five chapters:

*e1 CHAPTER 1 PRODUCTS AND TECHNOLOGY*

*e2 CHAPTER 2 NATURAL ENVIRONMENT AND HUMAN-MADE CHANGES TO*

*e3 CHAPTER 3 SUPPORT AND RELATIONSHIPS*

*e4 CHAPTER 4 ATTITUDES*

*e5 CHAPTER 5 SERVICES, SYSTEMS AND POLICIES*

Each chapter has a range of lower levels (shown below). Definitions and other levels are available online from the WHO ICF Browser:  
<<http://apps.who.int/classifications/icfbrowser/>>.

### **e1 CHAPTER 1 PRODUCTS AND TECHNOLOGY**

*e110 Products or substances for personal consumption*

*e115 Products and technology for personal use in daily living*

*e120 Products and technology for personal indoor and outdoor mobility and transportation*

*e125 Products and technology for communication*

*e130 Products and technology for education*

*e135 Products and technology for employment*

*e140 Products and technology for culture, recreation and sport*

*e145 Products and technology for the practice of religion and spirituality*

*e150 Design, construction and building products and technology of buildings for public use*

*e155 Design, construction and building products and technology of buildings for private use*

*e160 Products and technology of land development*

*e165 Assets*

*e198 Products and technology, other specified*

*e199 Products and technology, unspecified*

### **e2 CHAPTER 2 NATURAL ENVIRONMENT AND HUMAN-MADE CHANGES TO ENVIRONMENT**

*e210 Physical geography*

*e215 Population*

*e220 Flora and fauna*

*e225 Climate*

*e230 Natural events*

*e235 Human-caused events*

*e240 Light*

*e245 Time-related changes*

*e250 Sound*

*e255 Vibration*

*e260 Air quality*

*e298 Natural environment and human-made changes to environment, other specified*

*e299 Natural environment and human-made changes to environment, unspecified*

### **e3 CHAPTER 3 SUPPORT AND RELATIONSHIPS**

*e310 Immediate family*

*e315 Extended family*

*e320 Friends*

*e325 Acquaintances, peers, colleagues, neighbours and community members*

*e330 People in positions of authority*

*e335 People in subordinate positions*

*e340 Personal care providers and personal assistants*

*e345 Strangers*

*e350 Domesticated animals*

*e355 Health professionals*

*e360 Other professionals*

*e398 Support and relationships, other specified*

*e399 Support and relationships, unspecified*

#### **e4 CHAPTER 4 ATTITUDES**

- e410 Individual attitudes of immediate family members*
- e415 Individual attitudes of extended family members*
- e420 Individual attitudes of friends*
- e425 Individual attitudes of acquaintances, peers, colleagues, neighbours and community members*
- e430 Individual attitudes of people in positions of authority*
- e435 Individual attitudes of people in subordinate positions*
- e440 Individual attitudes of personal care providers and personal assistants*
- e445 Individual attitudes of strangers*
- e450 Individual attitudes of health professionals*
- e455 Individual attitudes of health-related professionals*
- e460 Societal attitudes*
- e465 Social norms, practices and ideologies*
- e498 Attitudes, other specified*
- e499 Attitudes, unspecified*

#### **e5 CHAPTER 5 SERVICES, SYSTEMS AND POLICIES**

- e510 Services, systems and policies for the production of consumer goods*
- e515 Architecture and construction services, systems and policies*
- e520 Open space planning services, systems and policies*
- e525 Housing services, systems and policies*
- e530 Utilities services, systems and policies*
- e535 Communication services, systems and policies*
- e540 Transportation services, systems and policies*
- e545 Civil protection services, systems and policies*
- e550 Legal services, systems and policies*
- e555 Associations and organizational services, systems and policies*
- e560 Media services, systems and policies*
- e565 Economic services, systems and policies*
- e570 Social security services, systems and policies*
- e575 General social support services, systems and policies*
- e580 Health services, systems and policies*
- e585 Education and training services, systems and policies*
- e590 Labour and employment services, systems and policies*
- e595 Political services, systems and policies*
- e598 Services, systems and policies, other specified*
- e599 Services, systems and policies, unspecified*

# List of shortened forms

|         |   |
|---------|---|
| ABS     | Australian Bureau of Statistics   |
| AIHW    | Australian Institute of Health and Welfare  |
| BMI     | Body Mass Index   |
| BoD     | Burden of Disease   |
| CIHI    | Canadian Institute for Health Information   |
| COPD    | Chronic obstructive pulmonary disease   |
| CSDH    | Commission on Social Determinants of Health   |
| DoH     | Determinants of health  |
| DSM     | Diagnostic and Statistical Manual of Mental Disorders                                     |
| GBoD    | Global Burden of Disease  |
| ICD     | International Statistical Classification of Diseases and Related Health Problems          |
| ICECI   | International Classification of External Causes of Injury                                 |
| ICF     | International Classification of Functioning, Disability and Health                        |
| ICF-CY  | International Classification of Functioning, Disability and Health for Children and Youth |
| ICPC    | International Classification of Primary Care  |
| IGT     | Impaired glucose tolerance  |
| ILO     | International Labour Organization   |
| ISO     | International Organization for Standardization  |
| NCCCH   | National Centre for Classification in Health  |
| nec     | necessarily   |
| NES     | Not elsewhere specified   |
| NHANES  | National Health and Nutrition Examination Survey [US]                                     |
| PH      | Public health   |
| PHCP    | Public Health Classification Project  |
| PHIDG   | Population Health Information Development Group   |
| PHIDU   | Public Health Information Development Unit  |
| PHont   | Public Health ontology – version one of a classification of public health                 |
| SES     | Socio-economic status   |
| UNECE   | United Nations Economic Commission for Europe   |
| UNSD    | United Nations Statistics Division  |
| WHO     | World Health Organization   |
| WHO-FIC | World Health Organization Family of International Classifications Network                 |

# Glossary

**Ability to pay for health care** – ability to make any required per capita out of pocket expenditure on health care (eg patient/client co-payments for health care services or pharmaceuticals, purchase of food in hospital, ‘attention’ co-payments to [salaried] doctors) (Lin et al. 2003).

**Attitudes** – [Chapter 4 in ICF: Environmental Factors]: ‘This chapter is about the attitudes that are the observable consequences of customs, practices, ideologies, values, norms, factual beliefs and religious beliefs. These attitudes influence individual behaviour and social life at all levels, from interpersonal relationships and community associations to political, economic and legal structures; for example, individual or societal attitudes about a person’s trustworthiness and value as a human being that may motivate positive, honorific practices or negative and discriminatory practices (eg stigmatizing, stereotyping and marginalizing or neglect of the person). The attitudes classified are those of people external to the person whose situation is being described. They are not those of the person themselves. The individual attitudes are categorized according to the kinds of relationships listed in Environmental Factors Chapter 3. Values and beliefs are not coded separately from the attitudes as they are assumed to be the driving forces behind the attitudes’ (WHO ICF 2009).

**Biomarker** – a biochemical substance used as an indicator of biological function or state. Biomarkers can be objectively measured and evaluated to provide an indication of normal biological processes (eg the state of an organ), pathogenic processes (eg the presence, progress, or severity of a disease), or the effects of treatment (eg biological response to a prescribed pharmaceutical). Biomarkers are detectable and measurable by a variety of methods including physical examination, laboratory assays and medical imaging.

**Built or urban physical environment** – ‘the urban physical environment includes the built environment, the air city dwellers breathe, the water they drink and bathe in, the indoor and outdoor noise they hear, the parkland inside and surrounding the city, and the geological and climate conditions of the site where the city is located’ (Galea, Freudenberg & Vlahov 2005:1025).

**Care seeking** – actions to involve some other person in a health-related issue as a response to a (perceived or actual) health problem including illness. Care seeking behaviour involves the services of some other person, either a layperson, health professional, or healer; and may be preventive as well as a response to health problems such as illness symptoms but it involves a direct encounter with a person (for this reason: response to health problems) rather than mere participation in a screening or preventive program (after Gochman 1997:417-419).

**Crime and violence** – health consequences, suffering and risks deriving from acts of aggression against persons. Violence is the expression of physical force against self or other; violent action is that intended to cause destruction, pain, or suffering.

**Culture** – includes cultural roles and other cultural determinants affecting health. For example, cultural sanctions against talking about mental health or sexual health, that prevent seeking help for problems in these areas.

**Education** – education level or achievement or years of education; one of three essential measures used in tandem to determine SES (the others being occupational status and income) (Kunst & Mackenbach 2000:12).

**Employment status** – employment status (eg whether employed in the labour force, unemployed, under-employed, not in the labour force) and employment type (eg full-time, part-time, non-standard work/ hours such as shiftwork; casual, permanent, contractor; etc.; may include secure/ insecure dichotomies).

**Environmental safety** – see **Safety and security**.

**Ethnicity** – ethnicity is a social construct that describes the ethnic group from which an individual is descended and/or with which they identify.

**Financial resources** – the financial resources that people have at their disposal for various purposes. Income and wealth are partial measures of financial resources, while financial stress is a measure of their lack. Financial resources include the ability to pay for health care.

**Financial stress/ capability** – activity constraints due to shortage of and/or inability to raise money, often assessed by indicators such as the ability to raise ‘emergency money’ (eg a person’s perception of whether they or other members of the household could obtain \$2,000 for something important within a week [ABS 2007]). Other measures include: whether people have cash flow problems, and whether people have taken dissaving actions (spending more than they earn) (adapted from ABS 2007).

**Frailty** – infirmity: the state of being weak in health or body (especially from old age) (Princeton WordNet).

**Gender** – socially constrained gender roles and other gender-related factors that affect health. The term ‘gender’ describes those characteristics of women and men, boys and girls, which are socially constructed, while the term ‘sex’ refers to those that are biologically determined. People are born female or male but learn to be girls and boys who grow into women and men, and it is this learned behaviour that makes up gender identity and determines gender roles (WHO 2002c).

**Genotype** – the specific genetic makeup of a given individual. Although genotypes give rise to the phenotype of an individual, genotypes and phenotypes are not always correlative. For example, some genotypes are expressed only under specific environmental conditions. ‘Genetic risk factors are defined as changes in the base pair sequence of the human genome, which do not change during life’ (Stolk et al. 2008:69). See also Phenotype.

**Health cognition** – ‘thought processes that serve as frames of reference for organising and evaluating health, illness, disease, and sickness’ (Gochman 1997:418). Examples include: ‘Definitions: health, illness, am I sick? Perceptions of symptoms. Representations: images, schemata, interpretations of illness. Perceptions, expectations, beliefs: eg perceived health status, perceived vulnerability, perceived threat; beliefs about control; intentions’ (Gochman 1997:418-419).

**Health literacy** – cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand and use information in ways that promote and maintain good health, including the ability to understand instructions on prescription pharmaceuticals, appointment slips, health education brochures, doctors’ directions and consent forms, and the ability to negotiate what are frequently complex health care systems (WHO 1998:10).

**Housing** – see **Shelter and housing**

**Hygiene** – a condition promoting sanitary practices (eg ‘personal hygiene’); the science concerned with the prevention of illness and maintenance of health (Princeton WordNet). Examples of hygiene behaviours include: hand washing, hygienic food preparation and handling, infection control procedures in healthcare settings. Note that some hygiene behaviours are general (eg children taught hand-washing in school to prevent disease generally) while others are specific against certain diseases (eg hygienic food preparation procedures to prevent food contamination with, and the spread of, food-borne disease).

**Income** – income level, access to income, percentage of income that is disposable income; one of three essential measures used in tandem to determine SES (the others being occupational status and education level) (Kunst & Mackenbach 2000:12). ‘Individual and household income derive primarily from paid employment. Income provides individuals and families necessary material resources and determines their purchasing power. Thus income contributes to resources needed in maintaining good health’ (CSDH 2007:26).

**Insurance coverage** – coverage of risk by a third party in exchange for payment of a voluntary or compulsory levy or premium.

**Injury protective behaviours** – behaviours that are protective against injury, such as the wearing of protective clothing and headgear by motorcyclists and bicyclists (eg wearing cycle helmets, luminous jackets or other clothing and shoes) or in specific workplace circumstances to protect against injury, seatbelt use, etc.

**Language** – proficiency in the main language of the country or area is a determinant of health as it affects the ability to communicate with care-providers, and to know about and access health-related information and services generally; belonging to a specific linguistic group may also contribute to racism and other forms of ostracism and negatively-valued stereotypes that cumulatively affect health more directly.

**Lifestyle** – (as in ‘lifestyles conducive to health’) – ‘a way of living based on identifiable patterns of behaviour which are determined by the interplay between an individual’s personal characteristics, social interactions, and socioeconomic and environmental living conditions’ (adapted from WHO 1998:16 ‘lifestyle’). Other definitions incorporate the concept of patterns or clusters of activities, interests, and opinions (eg in market research and survey analysis) or behaviours including risk/ protective factors (eg smoking, gambling and drinking alcohol; healthy eating and regular exercise).

**Literacy** – the functional literacy required to comprehend the basic texts and documents associated with competent citizenship; ‘using printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential’ (Kirsch et al. 1993:2); and ‘the ability to identify, understand, interpret, create, communicate and compute using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potentials, and participate fully in the community and wider society.’ (Definition of literacy agreed during a June 2003 meeting organized by the UNESCO Institute for Education, the Basic Education Section of UNESCO and the UNESCO Institute for Statistics [UIS]; cited in UIS 2008:25). See also Health literacy.

**Life course** – an individual’s life from birth to death as enacted in social and historical contexts.

**Living conditions** – ‘the everyday environment of people, where they live, play and work. These living conditions are a product of social and economic circumstances and the physical environment – all of which can impact upon health – and are largely outside of the immediate control of the individual’ (WHO 1998:16). Unhealthy living conditions include, for example, over-crowding, lack of ‘health hardware’ (functioning toilets and the means for washing bodies and clothes, storing food safely, etc.) and resulting poor hygiene.

**Living standard** – the level of material comfort in terms of goods and services available to someone or some group (Princeton WordNet); but can also imply a relative (adequate) minimum of necessities, comforts, or luxuries considered essential to maintaining a person or group in customary or proper status or circumstances.

**Malnutrition** – deficiencies, excesses or imbalances in intake of energy, protein and/or other nutrients. Contrary to common usage, the term ‘malnutrition’ correctly includes both under-nutrition and over-nutrition (WHO 2009a).

**Nutritional status** – nutritional status (standing or condition) measured at a point in time, which determines whether a person is malnourished, well nourished, or over-nourished, for example. See also Malnutrition, Over-nutrition.

**Occupation** – occupation, occupational status; one of three essential measures used in tandem to determine SES (the others being education level and income) (Kunst & Mackenbach 2000:12). Classified by relevant international or national classifications of occupations. ‘Occupation-based social class relates people to social structure. Occupational social class positions indicate status and power, and reflect material conditions related to paid work’ (CSDH 2007:26).

**Over-nutrition** – a chronic condition where intake of food is in excess of dietary energy requirements, resulting in overweight and/or obesity (WHO 2009a).

**Pain behaviours** – verbal or non-verbal responses to pain that may include talking about pain; avoiding routine activities, or restriction of movement because of pain; rubbing, protecting or guarding an affected part of the body; or grimacing, or sighing [adapted from: (1) [www.nationalpainfoundation.org/MyTreatment/MayoClinic\\_glossary.asp](http://www.nationalpainfoundation.org/MyTreatment/MayoClinic_glossary.asp); and (2) [www.pbs.org/secondopinion/episodes/chronicpain/medicalglossary/story425.html](http://www.pbs.org/secondopinion/episodes/chronicpain/medicalglossary/story425.html)].

**Pesticides** – Pesticide residues. ‘Pesticides pose a number of risks to health. Spray drift, particularly around the urban/rural fringe, is of particular concern. One possible source of information may be hospital admissions associated with pesticide use/misuse. Further work needs to be undertaken in this area’ (Kingsland 2006:58).

**Phenotype** – the physical appearance of an individual that is the result of that individual’s genotype and the interaction of the genotype with the environment during development. Hence, individuals with the same genotype may have different phenotypes in different environments. See also Genotype.

**Religious belief or spirituality** – as it affects health, for example, belief that certain medical interventions should or should not be done (eg circumcision, blood transfusions); spiritual acceptance of condition, etc.

**Response to illness** – actions undertaken to restore or maintain health; denotes behaviours related to adherence with treatment regimes, self-management, and reduction of risks attributed to a specific behaviour, eg reducing fat, sodium or caloric intake (after Gochman 1997).

**Risk behaviour** – ‘specific forms of behaviour which are proven to be associated with increased susceptibility to a specific disease or ill-health’ (WHO 1998:18 ‘Risk behaviour’).

**Risk factors** – factors that are associated with increased susceptibility to a specific disease or ill-health (adapted from WHO 1998:18). Risk factors are partial, not sufficient, not always necessary, but contributing, component causes to rising rates of disease and mortality. The concept is based on the findings of the Framingham study that increasing rates of chronic disease and cardiovascular mortality were attributable not to a single exposure but instead to a variety of factors, leading the researchers to coin the term ‘risk factors’ (Krieger 2008:222; Dawber & Kannel 1966). The risk factors concept has motivated the development of more complex disease causation models (eg the WHO

CSDH framework on the leading social determinants of health) to move public health from a monocausal to a 'multifactorial account of disease causation' involving agent + host + environment (Krieger 2008:222).

**Safety and security** – the experience and feeling of physical and personal safety as generally indicated by a range of data on accidents and injury, crimes of various kinds and environmental risks, as well as negative indicators of system failure. Environmental safety can be represented by the key area of air quality (eg Australia monitors four selected pollutants on a routine basis) (AIHW 2001:391).

**Senses** – the senses are the faculties through which the external world is apprehended (eg 'in the dark he had to depend on touch and on his senses of smell and hearing'; acronyms include: sense, sentience, sentiency, sensory faculty). A sensation is an unelaborated elementary awareness of stimulation (eg 'a sensation of touch'; acronyms include: aesthesis, sense experience, sense impression, sense datum). (Adapted from Princeton WordNet)

**Services, systems and policies** – [Chapter 5 in ICF: Environmental Factors]: 'This chapter is about: **1. Services** that provide benefits, structured programmes and operations, in various sectors of society, designed to meet the needs of individuals. (Included in services are the people who provide them.) Services may be public, private or voluntary, and may be established at a local, community, regional, state, provincial, national or international level by individuals, associations, organizations, agencies or governments. The goods provided by these services may be general or adapted and specially designed. **2. Systems** that are administrative control and organizational mechanisms, and are established by governments at the local, regional, national, and international levels, or by other recognized authorities. These systems are designed to organize, control and monitor services that provide benefits, structured programmes and operations in various sectors of society. **3. Policies** constituted by rules, regulations, conventions and standards established by governments at the local, regional, national, and international levels, or by other recognized authorities. Policies govern and regulate the systems that organize, control and monitor services, structured programmes and operations in various sectors of society.' (WHO 2001:192).

**Shelter and housing** – housing is widely recognised as a fundamental human need and a key component of quality of life and determinant of health (AIHW 2001:391). For example, over-crowding is associated with transmission of infectious diseases and parasites; lack of shelter can be the cause of premature deaths especially in cold conditions.

**Social and support network** – the ability to find or provide assistance during times of need as an indication of the strength of social supports and networks; the notion of reciprocity is another core element of social cohesion (AIHW 2001:394). Lack of social and support networks can contribute to less than optimum health outcomes, for instance, lack of carers for people who need them.

**Social capital** – 'the degree of social cohesion which exists in communities. It refers to the processes between people which establish networks, norms, and social trust, and facilitate co-ordination and co-operation for mutual benefit'; and 'Social capital is created from the myriad of everyday interactions between people, and is embodied in such structures as civic and religious groups, family membership, informal community networks, and in norms of voluntarism, altruism and trust. The stronger these networks and bonds, the more likely it is that members of a community will co-operate for mutual benefit. In this way social capital creates health, and may enhance the benefits of investments for health.' (WHO 1998:19)

**Social class/caste** – defined by relations of ownership or control over productive resources (i.e. physical, financial, organisational) (CSDH 2007:25). Some countries/ societies/ times are more class- or caste-based than others, or are so in different ways. Differences and distinctions may not be the same for all and should be calculated and interpreted in context.

**Social class** – 1. people having the same social, economic, or educational status; 'the working class'; 'an emerging professional class' (Princeton WordNet). 2. The concept of 'social class', defined by 'relations of ownership or control over productive resources' was included as a distinct component in socioeconomic position by the WHO CSDH: 'People attain different positions in the social hierarchy according mainly to their social class, occupational status, educational achievement and income level. Their position in the social stratification system can be summarised as their socioeconomic position [and m]easures of social stratification are important predictors of patterns of mortality and morbidity. (CSDH 2007:24, 25)

**Social caste** – 1. a social class separated from others by distinctions of hereditary rank or profession or wealth; 2. in Hinduism a hereditary social class among Hindus; 3. stratified according to ritual purity (Princeton WordNet). Experiences of caste in everyday India occur in the areas of marriage, occupation, urbanisation, concepts of purity, and pollution barriers; interpersonal relationships (eg between peasants, landlords and merchants); and 'caste war' violence (Bayly & Johnson 2001).

**Social environment** – ‘the structure and characteristics of relationships among people within a community. Components ... include social networks, social capital, segregation, and the social support that interpersonal interactions provide’ (Galea, Freudenberg & Vlahov 2005:1026).

**Social support** – ‘that assistance available to individuals and groups from within communities which can provide a buffer against adverse life events and living conditions, and can provide a positive resource for enhancing the quality of life’ (WHO 1998:20).

**Socio-economic status (SES)** – ‘socioeconomic status and factors – such as income (including levels and distribution) and associated levels of poverty and inequality, education, the existence of social support networks, etc. – are important determinants of health, often through their effects on other risk factors. The effects of each of these factors on health are, however, highly dependent on other socioeconomic variables as well as the policy context, including accessibility and effectiveness of health and welfare systems’ (Ezzati et al. 2004:9).

**Strength** – physical strength is the ability of a person or animal to exert force on physical objects using muscles (Wikipedia).

**Support and relationships** – [Chapter 3 in ICF: Environmental Factors]: ‘This chapter is about people or animals that provide practical physical or emotional support, nurturing, protection, assistance and relationships to other persons, in their home, place of work, school or at play or in other aspects of their daily activities. The chapter does not encompass the attitudes of the person or people that are providing the support. The environmental factor being described is not the person or animal, but the amount of physical and emotional support the person or animal provides.’ (WHO 2001:187)

**Transport** – as a (Physical) Environmental determinant of health, transport includes road traffic accidents and access to public transport (eg for the journey to work); as well as – at an area level – the existence of dedicated cycle and walking trails, and public transport acceptability, affordability, appropriateness and patronage (after Kingsland 2006:17).

**Under-nutrition** – the result of food intake that is continuously insufficient to meet dietary energy requirements, poor absorption and/or poor biological use of nutrients consumed. This usually results in loss of body weight (WHO 2009a).

**Working conditions** – conditions pertaining to a worker’s job environment, such as hours of work, safety, paid holidays and vacations, rest periods, free clothing or uniforms, access to training opportunities, possibilities of advancement, etc. (The Steward’s Dictionary). May include the conditions of enforced labour (eg child and adult sex trade); the age of labour (eg child labour); hours of paid and unpaid labour (eg overwork); and employment segregation (Lin et al. 2003). Clear social differences exist in the workplace and result in differences in physical, mental, chemical and ergonomic strains. Their accumulation throughout working life leads to variations in the general health of the population, especially when people are exposed to negative factors over long periods. Workplace hazards include physical, chemical, ergonomic, biological, and psychosocial risk factors. Although minimum standards for working conditions are defined in each country, many workers are excluded from existing labour protection measures (eg workers in cottage industries; in informal urban and rural economies; domestic and home workers). Other workers are not effectively protected due to weaknesses in enforcement, especially workers in small enterprises, which form over 90 per cent of enterprises in many countries, with high proportions of female workers (adapted from CSDH 2007:36).



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