United Nations Division for Sustainable Development

Expert Group Meeting on
Indicators of Sustainable Development
New York, 13-15 December 2005

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Indicators of Sustainable Development - Review and Assessment *

Background paper

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ABBREVIATIONS

BOD	biological oxygen demand
CFC	Chloro-fluoro carbon
CIESIN	Center for International Earth Science Information Network
CSD	Commission on Sustainable Development
CSD-ISD	CSD Indicators of Sustainable Development
DAC	Development Assistance Committee
DESA	United Nations Department of Economic and Social Affairs
DESA-DSD	United Nations Division for Sustainable Development
DOTS	directly observed treatment short-course
EISD	Energy Indicators for Sustainable Development
FAO	Food and Agricultural Organization of the United Nations
FDI	foreign direct investment
GDP	gross domestic product
GNI	gross national income
GNP	gross national product
HIPC	Heavily Indebted Poor Countries Initiative
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
ILO	International Labour Organization
ITU	International Telecommunications Union
IUCN	The World Conservation Union
LDCs	least developed countries
MDG	Millennium Development Goals
NSDS	national sustainable development strategies
ODA	Official Development Assistance
ODP	Ozone Depleting Potential
OECD	Organization for Economic Co-operation and Development
PPP	purchasing power parity
R&D	research and development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction
UNODC	United Nations Office on Drug and Crime

UNSD	United Nations Statistics Division
WHO	World Health Organization

I. Introduction

It is widely acknowledged that indicators of sustainable development are important tools to increase focus on sustainable development and to assist decision-makers at all levels to adopt sound national sustainable development policies. The 1992 Earth Summit recognized the importance and called upon countries and the international community to develop such indicators. In response, the Commission on Sustainable Development (CSD) approved in 1995 the Programme of Work on Indicators on Sustainable Development. The work programme culminated in a set of 58 indicators, based on a Theme / Sub-theme framework. The set was adopted by the CSD in 2001 after extensive consultations and national testing programmes. The World Summit on Sustainable Development in 2002 and subsequent sessions of the CSD encouraged further work on indicators for sustainable development by countries in line with national conditions and priorities and invited the international community to support efforts of developing countries in this regard.

The importance of indicators for measuring development progress and focusing national and international attention to main areas of concern has also been stressed in other major development initiatives. Among those, the Millennium Development Goals, adopted at the Millennium Summit in 2000 and confirmed at this years' World Summit, have found widespread attention throughout the world.

The United Nations Division for Sustainable Development (DESA-DSD) is currently reviewing the set of CSD Indicators of Sustainable Development (CSD-ISD). This background paper has two specific aims within the revision process:

- To assess proposals to revise the CSD-ISD made by international agencies and organizations; and
- to assess the coherence between CSD-ISD and the Millennium Development Goal (MDG) indicators.

The first assessment is based on the inputs by a large number of international agencies, which have responded to a query by DESA-DSD and submitted proposals to reconfirm, modify or add specific indicators. The assessment incorporates proposals for revising CSD-ISD received by DSD as per November 2005. The second assessment is to further harmonization, as appropriate.

The following section of this paper starts with a brief comparison of the current CSD-ISD and MDG indicators. The section then presents a broad assessment based on the mapping of all MDG indicators and of newly proposed indicators into the CSD-ISD framework. It is shown that CSD-ISD has a broader coverage, especially on environmental issues. At the same time, the MDG indicators give a deeper picture of certain health issues as well as of aid and trade flows between developed and developing countries. Many proposed new indicators address issues that are neither covered by the current CSD-ISD nor by the MDG indicators.

Sections 3 to 6 then deliver a more detailed assessment for indicators falling into the four different areas of the CSD-ISD (social, environmental, economic, and institutional). This assessment gives due attention to the proposals for harmonizing CSD-ISD and MDG indicators, where appropriate, and are guided by the principle of keeping the size of the indicator set close to its current value. Moreover, the selection criteria for indicators on sustainable development established in the CSD Indicator Work Programme (1995-2000) are taken into account.[1]

The assessment comes to the tentative conclusion that only a few of the MDG indicators without corresponding CSD-ISD should be included in the revised CSD-ISD. This assessment is consistent with the view that most differences between the two indicator sets can be related to their different purposes. Harmonization of indicators that measure closely related items should be pursued in selected cases, whereas minor differences in definitions should be eliminated to the extent possible. A limited number of new indicators could be incorporated.

Section 7 contains a brief conclusion. The 25 revised methodology sheets that have been received by DESA-DSD are contained in annexes for reference.

[1] The criteria are that indicators should be primarily national in scope, relevant, understandable, within the capabilities of national governments, conceptually sound, limited in number, broad in coverage of Agenda 21 and all aspects of sustainable development, representative of an international consensus to the extent possible, and dependent on cost effective data of known quality.

II. Scope and Coverage of Two Indicator Sets

In order to draw meaningful conclusions from a comparison between CSD-ISD and MDG indicators, it is important to take the different purposes of the two sets into account. The main role of the CSD-ISD is to serve as a starting point for countries to develop national indicators for sustainable development. The national focus is a central characteristic of the CSD-ISD and has been continuously reaffirmed by the CSD as well as by the World Summit on Sustainable Development.[2] The MDG indicators are primarily used for global monitoring of the internationally agreed Millennium Development Goals.

The international focus of the MDG indicators implies a need for selection criteria that are less relevant for nationally oriented sets. This holds, e.g., for the need of MDG indicators to allow for meaningful regional and global aggregation. International comparability of data is of lower importance for national decision-makers, even though it may facilitate learning from other countries' experiences. However, for international indicators it is a central requirement. Even though national ownership of data is important for both sets, it certainly plays a stronger role in nationally focused sets.

Moreover, actual data availability for a large enough set of countries is a central criteria of indicators for global monitoring, whereas both actual and potential availability should be considered for a set like CSD-ISD that is designed to be adapted to the needs and priorities of each country.

Further explanations for differences in the sets can be found in the different processes for selecting the indicators, especially the possibility of using national testing for determining the CSD-ISD.

It should be noted that in the preparation of national MDG reports, many countries, in fact, departed from the MDG indicators to reflect national circumstances. It would be interesting in this regard to compare indicators used in national MDG reports with national sets of indicators for sustainable development. Such comparison, which could take into account current work on the relation between official MDG indicators and indicators used in national MDG reports as well as work on the relation between

[2] A list of relevant mandates can be found at http://www.un.org/esa/sustdev/sdissues/information/info_decisions.htm

MDG indicators and indicators used in national Poverty Reduction Strategy papers, is beyond the scope of this background paper.

Both CSD-ISD and MDG indicators are core indicator sets of very similar size, containing a fairly large number of separate indicators covering a wide range of issues. The CSD-ISD is based on a theme/sub-theme framework, which consists of 15 themes and 38 sub-themes. The themes are further assigned to the four dimensions of sustainable development: social, environmental, economic and institutional. However, it should be stressed that this does not imply that the themes are one-dimensional, as many of them affect sustainable development in many dimensions. The framework and the indicator set have been developed in response to an extensive testing period by 22 countries of a first indicator set which consisted of 134 indicators embedded in a 'Driving force – State – Response' framework. Four main factors guided the development of the current theme/sub-theme framework: country recommendations; inclusion of common priority issues; comprehensiveness and balance across the sustainable development spectrum; and limiting the number of indicators to achieve a core set.

The MDG indicators are placed within a framework of 8 goals and 18 targets. In order to compare the two sets, it is assessed how the MDG indicators relate to the themes and sub-themes in the CSD-ISD framework. Due to the differences in the framework and character of some indicators, this task contains some degree of subjectivity. For example, MDG target 9 calls to "Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources", whereas the CSD-ISD framework has separate sub-themes for implementation of sustainable development strategies and policies and for each of the various environmental resources. At the same time, the CSD-ISD framework includes only one sub-theme on health care delivery, whereas the MDG framework has separate targets for various diseases.

Table II-1, on pages 23 to 29, compares the CSD-ISD and MDG indicators using the CSD theme/sub-theme framework. It also includes proposals for new indicators. Some proposals from international agencies suggest relevant new sub-themes, which are added in italic into the current framework. Proposals on indicators as replacements for existing indicators are marked with an asterisk. Further explanations are provided in

footnotes and are discussed in the subsequent sections. Indicators appear in the same line whenever they are identical, similar or at least measure similar aspects. There is, unavoidably, some element of arbitrariness in this assignment, but the results nevertheless provide a broad picture of commonalities and differences among the two sets as well as of the coverage of new indicators.

The table shows that all MDG indicators fit into the thematic framework of the CSD-ISD, but they cover only two thirds of the CSD themes. All but four of the health related MDG indicators fit into the 38 sub-themes, whereas half of the CSD-ISD sub-themes are not covered by MDG indicators. The degree of coherence of the two sets with regard to sub-themes is large on social issues, but low on environmental issues.

This broad assessment demonstrates that the CSD-ISD provides a more comprehensive coverage of sustainable development issues. It also exemplifies the deeper coverage of health issues in the MDG, but at loss of the coverage of environmental problems.

Proposals for new indicators received from international agencies are more or less evenly spread across the social, environmental and economic themes. At the same time, there is only one proposal for indicators on institutional issues. Most proposals stay within the current framework, but some would require modifications on the sub-thematic level. It should be emphasized that not all agencies have yet responded to the query sent by DESA-DSD and that further proposals may occur. Therefore, the proposals for revising the CSD-ISD as well as any assessment of them should be seen as tentative.

III. Indicators on Social issues

This section briefly assesses the compatibility between MDG indicators and the newly proposed indicators with the current CSD-ISD. Comments by international agencies on the relevance and appropriateness of indicators are also taken into account. The revised methodology sheets in the Annex, covering 22 indicators, provide further important information.

Table III-1: Indicators within the Equity Theme

CSD Indicators	***MDG Indicators***	***New Indicators***
	1. Proportion of population below $1 (1993 PPP) per day	
Percent of Population Living Below Poverty Line	**1a** Poverty Headcount (Percentage of population living below poverty line)	
	2. Poverty gap ratio [incidence x depth of poverty]	
Gini Index of Income Inequality	**3.** Share of poorest quintile in national consumption	Share in national consumption by quintile
Unemployment Rate	**45.** Unemployment rate of young people aged 15-24 years, each sex and total	
		Employment-population ratio
		Employment structure
	9. Ratio of girls to boys in primary, secondary and tertiary education	
	10. Ratio of literate women to men, 15-24 years old	
Ratio of Average Female Wage to Male Wage	**11.** Share of women in wage employment in the non-agricultural sector	
	12. Proportion of seats held by women in national parliament	

Table III-1 contains one indicator that is identical between the two sets, the headcount indicator on poverty prevalence. This indicator is without doubt the most common poverty indicator. The MDG indicator is used as an additional indicator to the main poverty indicator, which uses the international 1 $ per day poverty line (based on purchasing power parity exchange rates) rather than national poverty lines. Presumably this is to allow for cross-country comparison and to derive international trends, neither of which is relevant for the CSD-ISD.

There are three pairs of indicators with close similarities, so that the question of harmonization is of special importance. First, both sets use different indicators on the distribution of income or consumption. Whereas the Gini coefficient measures inequality of the whole population, the corresponding MDG indicator refers to the poorest quintile only. This difference can be explained with the formulation of MDG 1 of eradicating poverty, which is largely unaffected by changes in the distribution of income in the middle and high-income classes. However, for the CSD-ISD an indicator that addresses

inequality in general may be a more appropriate starting point for a country to work on. A further difference is that the MDG indicator refers to consumption rather than income, which may better address the question of contemporary economic well-being. It may also be noted that the Gini coefficient is the only index in the CSD-ISD, whereas most indicators are expressed in percentages. It may hence be worthwhile to consider choosing the share of consumption or income for all quintiles as indicator. Alternatively, the ratio of consumption or income of the lowest to the highest quintile may be a useful one-dimensional indicator. Ultimately, though, the choice critically depends on the judgment whether inequality per se or (relative) poverty impose limits to sustainable development. In case inequality among middle and high income classes is considered as a minor issue, the current MDG indicator would be more appropriate.

Second, the labor related indicators on gender equality are qualitatively quite different, as one refers to the treatment of men and women after access to the formal labor market, whereas the other is more concerned with the access per se. A harmonization of the two indicators may be appropriate, even though the limitations of a single indicator on this issue should be emphasized.

Third, on unemployment, the two indicators differ insofar as the MDG indicator refers to youth unemployment only, which can be explained with the focus of the corresponding target. The ILO, stressing the difficulty to address the problem of unemployment with a single indicator, has proposed to consider the employment ratio (number of employed persons divided by population of working age) or the ratio of wage employment ratio as an alternative indicator. Even though the prominence of the unemployment ratio in the public debate of most countries may be an important factor, the employment ratio would be a promising indicator for national sets of indicators for sustainable development as it is less influenced by short-term fluctuations.

The ILO also proposed an additional multi-dimensional indicator on employment structure. It may be noted, though, that, in general, multi-dimensional indicators may be difficult to explain to external users.

The MDG indicator on poverty gap may be too specific for the CSD-ISD set, taking into account the desire to maintain the current size. Gender specific issues of literacy and education may be more effectively dealt with by providing gender specific

figures within the relevant existing CSD-ISD. The remaining MDG indicator on the share of women in parliaments focuses on a very specific problem of gender inequality and may, therefore, not be appropriate for a core indicator set aiming at a broad representation of sustainable development issues.

Table III-2: Indicators within the Health Theme

CSD Indicators	***MDG Indicators***	***New Indicators***
Nutritional Status of Children	**4.** Prevalence of underweight children under five years of age	
	5. Proportion of population below minimum level of dietary energy consumption	
Mortality Rate Under 5 Year Old	**13.** Under-five mortality rate	
	14. Infant mortality rate	
	16. Maternal mortality ratio	
Life Expectancy at Birth		
Percent of Population with Adequate Sewage Disposal Facilities	**31.** Proportion of population with access to improved sanitation, urban and rural	
Population with Access to Safe Drinking Water	**30.** Proportion of population with sustainable access to an improved water source, urban and rural	
Percent of Population with Access to Primary Health Care Facilities		
Immunization Against Infectious Childhood Diseases	**15.** Proportion of 1 year-old children immunized against measles	
	17. Proportion of births attended by skilled health personnel	
	19a. Condom use at last high-risk sex	
	19b. Percentage of population aged 15-24 years with comprehensive correct knowledge of HIV / AIDS	
Contraceptive Prevalence Rate	**19c.** Contraceptive prevalence rate	
	19. Condom use rate of the contraceptive prevalence rate	
		Proportion of desire for family planning satisfied
		Total fertility rate
	22. Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures	
	24. Proportion of tuberculosis cases detected and cured under DOTS (internationally recommended TB control strategy)	

	18. HIV prevalence among pregnant women aged 15-24 years	
	20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years	
	21. Prevalence and death rates associated with malaria	
	23. Prevalence and death rates associated with tuberculosis	
		Proportion of population using solid fuels

There are five indicators that are either identical or differ only in details of the definition. The WHO as responsible agency has proposed to fully harmonize the indicators on the nutritional status of children, on sanitation and on access to drinking water. DESA-DSD would not expect these proposals to be controversial.

The indicators on mortality rates (under 5 years old) and on contraceptive prevalence are already identical. The DESA-Population Division has confirmed their relevance and updated the methodology sheets.

There is one indicator pair that is very close, but where the differences are nevertheless substantial. The MDG indicator on immunization against measles covers a subset of the CSD-ISD on prevention of infectious childhood diseases, which also includes other immunizations. The MDG indicator has been justified by the fact that measles is the leading cause of mortality in developing countries. Given the broader focus of CSD-ISD, the proposal of WHO to keep the indicator on immunization against (all) infectious childhood diseases seems to be warranted.

The DESA-Population Division has proposed to keep the indicators on life expectancy. As a standard development indicator, it seems to be well placed in the CSD-ISD. A similar conclusion can be drawn for the indicator on access to health care, whose relevance and appropriateness has been confirmed by the WHO.

The WHO also proposed two additional reproductive health indicators, of which the total fertility rate may be especially interesting due to its policy relevance in both developed and developing countries. In addition, the organization proposed to include the MDG indicator on solid fuels under the health theme. This proposal certainly warrants further discussion, bearing in mind the goal of trying to stay close to the

current size of the indicator set. It is also important to note that the solid fuel indicator may be dropped from the MDG indicators. The proposal should further be considered in context of possible indicators on access to energy (see the discussion in section V on page 19).

There are 13 health-related MDG indicators that are not part of the current CSD-ISD. Out of these, the indicators on HIV/AIDS prevalence as well as Malaria and tuberculosis incidence[3] may be worth considering for inclusion into a revised CSD-ISD set.

Table III-3: Indicators within the Education, Housing, Security and Population themes

CSD Indicators	***MD Indicators***	***New Indicators***
	6. Net enrolment ratio in primary education	
Children Reaching Grade 5 of Primary Education	**7.** Proportion of pupils starting grade 1 who reach grade 5	
	7a Primary Completion Rate	
Adult Secondary Education Attainment Level		
Adult Literacy Rate	**8.** Literacy rate of 15-24 year-olds	
Floor area by person	**32.** Proportion of households with access to secure tenure	
Number of Recorded Crimes per 100,00 Population		Number of intentional homicides per 100,000 population
Population of Urban Formal and Informal Settlements		
Population Growth Rate		Population growth in rural and urban areas
		Dependency ratio

There is one indicator used both as a CSD-ISD and as an MDG indicator. However, the indicator on children reaching grade 5 is currently under revision in the MDG context, mainly due to measurement and data availability problems. In this regard, UNESCO has discussed the gross intake rates to the last year of primary education as an alternative. This indicator, closely related to primary completion rate, might then be an appropriate replacement in the CSD-ISD.

[3] It should be noted that proposals have been tabled by the relevant sub-group on health to change the current MDG indicators of HIV/AIDS prevalence to cover all population in the 15-24 year range and to change the Malaria and tuberculosis indicators from prevalence to incidence.

The indicators on literacy rates are very similar, but differ due to the focus on youth in the MDG. Whereas the MDG indicators are more responsive to policy changes and, thereby, better able to assess effectiveness of education reforms, the CSD-ISD may be more appropriate to capture development impediments due to illiteracy.

Of the two housing indicators, the MDG indicator is focused on slums, whereas the CSD-ISD has a broader scope. Within housing, conditions in informal settlements constitute probably the most pressing obstacle to sustainable development. It should be noted, though, that the MDG indicator is currently under discussion to be changed. Moreover, within the CSD-ISD the issue of informal settlements is also covered in the population and land schemes. Therefore, it may be worth considering dropping this theme in order to create room for other indicators on pressing sustainable development issues.

The DESA-Population Division has proposed to keep the indicators on population growth and life expectancy. As standard development indicators, they seem to be well placed in the CSD-ISD. In addition, CIESIN has proposed to report the population change rate separately for rural and urban areas. CIESIN also proposed a stricter definition on urban settlements in the second CSD-ISD on population.

DESA-DSD has proposed to include the dependency ratio as additional demographic indicator. The indicator, which measures the ratio of young (0-15 years) and old (64 years and older) people to working age population (15-64 years), could be of high relevance in countries relying on either tax based or social contribution based social security systems. Alternatively, the old-age dependency ratio (excluding children below 15 years) may be useful to concentrate on challenges due to ageing.

The United Nations Office on Drug and Crime has proposed to change the crime indicator to the number of intentional homicides per 100,000 population, as changes in the current indicator over time as well as cross-country comparisons may be determined more by changes in reporting and investigative behavior than by crime incidence. The proposal is well founded and should be followed.

Currently, there are no proposals to change the indicator on secondary education. However, it may be worthwhile to extend the indicator to tertiary education,

or to develop a separate indicator on it. Gender disaggregated figures should be used for these as well as for other indicators in the CSD-ISD.

IV. Indicators on environmental issues

This section starts with considering indicators falling into the atmosphere and land themes.

Table IV-1: Indicators within the Atmosphere and Land themes

CSD Indicators	***MDG Indicators***	***New Indicators***
Emissions of Greenhouse Gases	**28.** Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)	
Consumption of Ozone Depleting Substances	**28.** Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)	
Ambient Concentration of Air Pollutants in Urban Areas		
Arable and Permanent Crop Land Area		
Use of Fertilizer		
Use of Agricultural Pesticides		
Forest Area as a Percent of Land Area	**25.** Proportion of land area covered by forest	
Wood Harvesting Intensity		
		Forest governance
Land Affected by Desertification		
Area of Urban Formal and Informal Settlements		

Among the three CSD-ISD indicators close or identical to the ones used in global MDG monitoring, the only one with a notable difference is the indicator on greenhouse gases. The MDG indicator considers only carbon dioxide, whereas the CSD-ISD includes all greenhouse gases. In light of the increase in data coverage due to reporting commitments under the Kyoto-protocol and the discussion of modifying this MDG indicator, the proposal of UNFCCC to keep the current CSD-ISD should be followed.

FAO as responsible agency has proposed to keep the indicator on forest area without changes. This proposal does probably not require extensive discussions.

FAO has also proposed to maintain the other three indicators on forests and agriculture. In light of proposals to include new indicators and the requirement to maintain the size of the indicator set, it may be worthwhile discussing whether some of

the existing indicators could be replaced or dropped. Potential candidates include the second forest indicator (Wood Harvesting Intensity) and one of the two indicators on agricultural production methods with potentially adverse affects on sustainable development. Based on the testing phase of the first CSD-ISD set, the indicator on fertilizer seems to be more appropriate to retain. IUCN has proposed forest governance as an additional indicator on forests. Further discussions on how to define forest governance and possible indicators would be necessary, as IUCN rightly points at the importance of this issue.

The proposal by WHO to retain the indicator on air pollution, with modifications as contained in the revised methodology sheet in the appendix, seems to well founded. Due to the importance of the issue, the indicator on desertification should be maintained. However, further discussions and modifications to this indicator may be needed to address, *inter alia*, the issue of data availability raised by UNSD. The decision on the indicator on urban areas should take the future role of the related indicator on urban population into account (see page 11).

Table IV-2: Indicators within the Ocean, Seas and Coasts; Fresh Water and Biodiversity themes

CSD Indicators	***MDG Indicator***	***New Indicators***
Algae Concentration in Coastal Waters		
Percentage of Total Population Living in Coastal Areas		
Annual Catch by Major Species		
		Marine environment indicator
Annual Withdrawal of Ground and Surface as Percent of Total Available Water		
BOD in Water Bodies		
Concentration of Faecal Coliform in Freshwater		
Protected Area as a Percent of Total Area	**26.** Ratio of area protected to maintain biological diversity to surface area	
		Effectiveness of management of protected areas
		Coverage of protected areas by biome and habitat

Area of Selected Key Ecosystems		Percentage of selected ecosystem under sustainable management programmes
Abundance of Selected Key Species		
		Assessment of threatened species

The responsible agencies have proposed retaining all CSD indicators on these themes. There is only one MDG indicator, which is identical to the corresponding CSD-ISD on biodiversity. IUCN has suggested including two additional indicators on protected areas in future revisions only, as additional work on definition and data collection is needed.

IUCN has also proposed additional indicators on key ecosystems and key species. Further discussions on this topic would be needed, taking into account the limited size of core sets of indicators.

Among the fresh water indicators, it may be advisable to consider dropping the BOD indicator, given the scarcity of country-level data reported by UNEP and the presumably high correlation with the indicator on faecal coliform.

UNSD has identified marine environment as an issue that is not adequately covered by the current CSD-ISD. Therefore, it may be worthwhile to decide on a fourth indicator within the Oceans, Seas and Coasts theme.

V. Indicators on economic issues

This section starts with indicators falling into the first of the two economic themes, called economic structure.

Table V-1: Indicators within the Economic Structure theme

CSD Indicators	***MDG Indicators***	***New Indicators***
GDP per Capita		
Investment Share in GDP		
		Inflation
		Tourism indicator
		Percentage of population with access to quality financial services
Balance of Trade in Goods and Services		Current account deficit as percentage of GDP

	38. Proportion of total developed country imports (by value and excluding arms) from developing countries and from LDCs, admitted free of duty	Share of imports from developing countries and from LDCs
	39. Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries	
	40. Agricultural support estimate for OECD countries as percentage of their GDP	
	41. Proportion of ODA provided to help build trade capacity	
Total Official Development Assistance (ODA) given or received as a percentage of GNP	**33.** Net ODA, total and to LDCs, as percentage of OECD / Development Assistance Committee (DAC) donors' gross national income (GNI)	
	34. Proportion of total bilateral, sector-allocable ODA of OECD / DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)	
	35. Proportion of bilateral ODA of OECD / DAC donors that is untied	
	36. ODA received in landlocked developing countries as a proportion of their GNIs	
	37. ODA received in small island developing States as proportion of their GNIs	
Debt to GNP ratio	**44.** Debt service as a percentage of exports of goods and services	
	42. Total number of countries that have reached their Heavily Indebted Poor Countries Initiative (HIPC) decision points and number that have reached their HIPC completion points (cumulative)	
	43. Debt relief committed under HIPC initiative	
		Net FDI inflows and outflows as percentage of GNI
		Remittances as percentage of GNI

There are two CSD-ISD indicators that are quite closely related. The indicator on ODA includes recipient countries and covers, therefore, MDG indicators 36 and 37 as well. To give a more complete picture of ODA flows and to take the importance of aid

for certain developing countries without special status into account, it may be useful to keep the universal country coverage of the current CSD-ISD. As in MDG indicator 33, donors may be asked to report ODA to LDCs separately. Moreover, it would be advisable to harmonize the definition of ODA based on the OECD/DAC criteria. Non OECD/DAC countries should be especially encouraged to report their often substantial aid outflows. The related MDG indicators 34 and 35 may be too specific for inclusion into CSD-ISD.

The MDG indicator on debt concentrates on the international dimension of debt and is especially relevant for developing countries that incur debt predominantly in foreign currency on foreign financial markets. However, especially for developed and most emerging economies, especially in Asia, that issue a large share of bonds in domestic markets and in domestic currency, the domestic tax base (i.e., at least potentially, the gross national income) would be the relevant source for repaying debt. Therefore, the current CSD-ISD may be kept in place as an, albeit incomplete, indicator on the sustainability of public finances. Nevertheless, the MDG indicator may be referenced as an important additional indicator for many developing countries. The other MDG indicators on debt, however, may not be relevant for national sustainable development indicators.

Both indicator sets contain trade indicators. However, they are regarded as unrelated in this paper, because the MDG indicators focus on North-South trade as a form of global partnership, whereas the CSD-ISD focuses on the implications of trade for the external financial situation of a country. In order to sharpen this focus, DESA-DSD would propose to replace this indicator with the current account balance, expressed as percentage of GDP. The trade balance is a major component of the current account, which also contains compensation of non-resident employees, international investment income and other current transfers. Temporary current account deficits will be balanced by decreases in net financial and non-financial assets or by changes in official reserves. Substantial current account deficits are, however, not sustainable over the long run and have to be reversed, because reserves are limited and because foreign countries will limit their net external asset positions over time.

In addition, DESA-DSD proposes to include an additional trade indicator related to the global partnership concept. MDG indicators 38 and 39 are measures for existing

trade barriers. However, most other CSD-ISD measure flow or stock rather than policy variables. Therefore, it may be advisable to use the share of imports from developing countries and LDCs rather than share of duty-free imports or tariff averages. This indicator also avoids methodological problems necessarily involved in the construction of an appropriate weighting scheme for tariff averages. In line with the proposed revisions on the ODA indicator and in order to reflect the increasing importance of South-South cooperation, developing countries and LDCs should be encouraged to consider this indicator as well.

UNSD proposed to keep GDP per capita and the investment ratio. These are very important standard development indicators. In this context, it could be worth mentioning that within national sets GDP could also be expressed in national currencies rather than US $, thereby avoiding problems of choosing appropriate exchange rates. In order to align the indicator with the standard formulation of economic policy objectives, one could also use GDP per capita growth rate as an indicator, either as an additional indicator or as an alternative.

Led by the perception of a weak coverage of economic issues in the current CSD-ISD, DESA-DSD proposed to include three additional economic indicators on inflation, foreign direct investment (FDI) and remittances. Even though the worldwide decline in inflation rate may indicate that price stability has become less of a common problem, inflation would still be an important indicator for unsustainable monetary policy that is highly relevant in a number of countries.

FDI and remittances are important sustainable external sources of financing for development that are for many countries far larger than ODA. Due to its relative stability over time, FDI is probably the most commonly used indicator on capital flows for sustainable development. Net equity flows (FDI plus foreign portfolio investment) or net capital flows (equity plus debt flows) would be viable alternative indicators. Remittances are one increasingly popular measure for positive impacts of emigration. Due to data quality problems and partial overlap with current account and capital flow indicators, the indicator may not deserve highest priority. Alternatively, one could also consider population based indicators on migration, probably to be placed under social issues.

UNSD proposed tourism as an additional sub-theme. Sustainable Tourism is indeed an important and growing issue of concern for many countries. Additional work will be required in order to select one or two indicators from the extensive lists of indicators of sustainable tourism that have been prepared by the World Tourism Organization and by many countries. The discussion may take into account that a number of tourism related indicators can be regarded as sub-indicators of economy-wide indicators contained in the current CSD-ISD. This holds, e.g., for the impact of tourism on water use, sanitation, waste and energy.

Table V-2: Indicators within the Consumption and Production Patterns theme

CSD Indicators	***MDG Indicators***	***New Indicators***
Intensity of Material Use		
Annual Energy Consumption per Capita		
Share of Consumption of Renewable Energy Sources		
Intensity of Energy Use	**27.** Energy use (kg oil equivalent) per $1 GDP (PPP)	
	29. Proportion of population using solid fuels	Share of households without access to electricity or commercial energy
		Land area dedicated to sustainable bioenergy production
Generation of Industrial and Municipal Solid Waste		
Generation of Hazardous Waste		
Management of Radioactive Waste		
Waste Recycling and Reuse		
Distance Travelled per Capita by Mode of Transport		

The indicator on energy intensity is almost identical in the two sets. UNSD has proposed to fully harmonize the definition of this indicator by using the units of measurement of the MDG indicator, which is certainly warranted. It may be noted again, though, that for national indicator sets, the conversion into US $ may not be necessary.

UNSD affirmed the relevance of the remaining energy indicators and has proposed to harmonize their definitions with the recently developed Energy Indicators for Sustainable Development (EISD).[4] However, in order to avoid an over-representation of the issue of energy consumption, it may advisable to drop one indicator, e.g. the one on consumption per capita. Moreover, DESA-DSD proposes to include the indicator on energy access from the EISD. This indicator is also under discussion as a replacement of the solid fuels MDG indicator.

FAO proposed the inclusion of an indicator on bioenergy production. This proposal may require further discussions, as the indicator addresses a rather specific aspect of sustainable production patterns.

No comment has been received on the indicator on material use. The widespread use of this indicator appears to be confined to the European Union. Therefore, it may be worthwhile to discuss dropping this indicator.

Eurostat has proposed to retain the indicator on transport and provided an updated methodology sheet, which addresses the question of data availability. Eurostat also highlighted the methodological problem of cross-border transport.

With regard to the indicator on radioactive waste, it should be noted that a revised indicator was already included in 2004. UNSD suggested the harmonization of this indicator with the EISD on Ratio of solid radioactive waste awaiting disposal to total solid radioactive waste generated. IAEA, however, proposes keeping the current CSD-ISD, mainly because an indicator based purely on the volume of radioactive waste may not properly measure the sustainability of radioactive waste management.

UNSD agrees with the relevance of the remaining three waste indicators and has provided updated methodology sheets.

[4] EISD is a core set of 30 indicators of energy related indicators of sustainable development. They are the product of joint work by IAEA, UNDESA, IEA, Eurostat and the European Environmental Agency (EEA).

VI Indicators on institutional issues

As the number of indicators on institutional issues is very limited, they are presented in a single table. It should be emphasized that currently only one agency has proposed a new indicator in this category. Eurostat, however, emphasized the need for indicators on good governance.

Table VI-1: Indicators on institutional issues

CSD Indicators	***MDG Indicators***	***New Indicators***
National Sustainable Development Strategy		
Implementation of Ratified Global Agreements		
		Good governance indicators
Number of Internet Subscribers per 1000 Inhabitants	**48.** Personal computers in use per 100 population and Internet users per 100 population	
Main Telephone Lines per 1000 Inhabitants	**47.** Telephone lines and cellular subscribers per 100 population	
Expenditure on R&D as a Percent of GDP		
Economic and Human Loss Due to Natural Disasters		
		Percentage of population living in disaster prone areas

There are two indicators on institutional issues in the two sets that are quite closely related. The responsible agency, ITU, originally proposed to keep the communication indicators as they are. Nevertheless, in light of the current process of modifying the MDG indicators, it is worthwhile to reconsider a harmonization. Consequently, ITU now proposes to change the indicator on Internet from subscriber to user, but to keep the current CSD-ISD as an alternative for countries without data on Internet users. The telecommunication indicator should include mobile as well as fixed line telephones, in order to address the importance of mobile technology especially for a

number of developing countries, including LDCs. Further details can be found in the revised methodology sheets in Annex 4.

Despite the lack of any comment on this issue, the share of research and development expenditures should probably be kept as an indicator addressing the important role of science for sustainable development.

UNEP as responsible agency has highlighted the difficulty in collecting data on the implementation of ratified agreements, mainly due to the absence of a coherent definition on implementation. However, choosing an indicator that just counts the ratification of agreements may miss the crucial importance of implementation.

The indicator on national sustainable development strategies (NSDS) faces a similar problem. There is no metric available for measuring implementation. If used as a simple yes/no indicator, the usefulness in national indicator sets may be limited. Further work on improving this indicator may, therefore, be necessary. Countries could also be encouraged to develop individual measures for implementation of their own NSDS.

Besides updating the methodology sheet on the current indicator on natural disaster, UNISDR has also proposed an indicator to cover a new sub-theme on vulnerability to natural hazards. This indicator, percentage of population living in disaster prone areas, is certainly an important measure of vulnerability to cyclones, drought, floods, earthquake, volcanoes and landslides. As this indicator would not be subject to enormous annual fluctuations, it may also replace the current disaster indicator. Nevertheless, further discussion may be required to determine whether additional indicators for disaster preparedness and response could be developed. It may be taken into account, though, that the development of one or two single meaningful indicators in this field may prove to be very difficult.

VII Summary and conclusion

This paper assessed the suitability of current reform proposals to the CSD-ISD as well as the coherence between CSD-ISD and MDG indicators. The first assessment has shown that essentially all proposals aiming at replacing existing indicators or at adding new indicators deserve serious consideration. A number of areas, including sustainable

tourism, marine environment, national strategies for sustainable development and good governance, require further work to identify appropriate indicators. For decisions on a revised list of CSD-ISD, the size criterion is likely to impose the most binding constraint. Therefore, and in anticipation of further proposals, it may be necessary to drop certain indicators from the list despite their continued relevance and soundness. As the comprehensive nature of the CSD-ISD should be maintained, the deletion of indicators may preferably be done among closely related indicators.

The second assessment has shown that coherence between CSD-ISD and MDG indicators is relatively high on social issues, but low on economic, institutional and, especially, environmental issues. To a large extent, the lack of coherence is rooted in the different purposes of the two indicators. This holds especially for the coverage of issues, which is intended to be broad in the CSD-ISD, but focused on certain priorities in the MDG. The difference between the national focus of the CSD-ISD and the international focus of the MDG is a further reason why the two indicator sets are distinct from each other. Nevertheless, there are a number of indicators where the current CSD-ISD could be harmonized with related MDG indicators without changing the purpose of the current set.

Table II-1: Mapping of MDG Indicators into CSD-ISD Framework

		SOCIAL		
Theme	***Sub-theme***	***CSD Indicators***	***MDG Indicators***	***New Indicators***
Equity	**Poverty**		**1.** Proportion of population below $1 (1993 PPP) per day	
		Percent of Population Living Below Poverty Line	**1a** Poverty Headcount (Percentage of population living below poverty line)	
			2. Poverty gap ratio [incidence x depth of poverty]	
		Gini Index of Income Inequality	**3.** Share of poorest quintile in national consumption	Share in national consumption by quintile*[a]
		Unemployment Rate	**45.** Unemployment rate of young people aged 15-24 years, each sex and total	
				Employment-population ratio*[b]
				Employment structure[c]
	Gender Equality		**9.** Ratio of girls to boys in primary, secondary and tertiary education	
			10. Ratio of literate women to men, 15-24 years old	
		Ratio of Average Female Wage to Male Wage	**11.** Share of women in wage employment in the non-agricultural sector	
			12. Proportion of seats held by women in national parliament	
Health	**Nutritional Status**	Nutritional Status of Children	**4.** Prevalence of underweight children under five years of age	
			5. Proportion of population below minimum level of dietary energy consumption	
	Mortality	Mortality Rate Under 5 Year Old	**13.** Under-five mortality rate	
			14. Infant mortality rate	
			16. Maternal mortality ratio	
		Life Expectancy at Birth		

[a] Proposed by DESA-DSD as alternative to Gini Index.
[b] Proposed by ILO as alternative to Unemployment Rate.
[c] Proposed by ILO as additional indicator.

Health	**Sanitation**	Percent of Population with Adequate Sewage Disposal Facilities	**31.** Proportion of population with access to improved sanitation, urban and rural	
	Drinking Water	Population with Access to Safe Drinking Water	**30.** Proportion of population with sustainable access to an improved water source, urban and rural	
	Health Care Delivery	Percent of Population with Access to Primary Health Care Facilities		
		Immunization Against Infectious Childhood Diseases	**15.** Proportion of 1 year-old children immunized against measles	
			17. Proportion of births attended by skilled health personnel	
			19a. Condom use at last high-risk sex	
			19b. Percentage of population aged 15-24 years with comprehensive correct knowledge of HIV / AIDS	
		Contraceptive Prevalence Rate	**19c.** Contraceptive prevalence rate	
			19. Condom use rate of the contraceptive prevalence rate	
				Proportion of desire for family planning satisfied [d]
				Total fertility rate [d]
	No CSD-ISD sub-theme applicable		**22.** Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures	
			24. Proportion of tuberculosis cases detected and cured under DOTS (internationally recommended TB control strategy)	
			18. HIV prevalence among pregnant women aged 15-24 years	
			20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years	

[d] Proposed by WHO as additional indicator.

Health	**No CSD-ISD sub-theme applicable**		**21.** Prevalence and death rates associated with malaria	
			23. Prevalence and death rates associated with tuberculosis	
				Proportion of population using solid fuels [e]
Education	**Education level**		**6.** Net enrolment ratio in primary education	
		Children Reaching Grade 5 of Primary Education	**7.** Proportion of pupils starting grade 1 who reach grade 5	
			7a Primary Completion Rate	
		Adult Secondary Education Attainment Level		
	Literacy	Adult Literacy Rate	**8.** Literacy rate of 15-24 year-olds	
Housing	**Living Conditions**	Floor area by person	**32.** Proportion of households with access to secure tenure	
Security	**Crime**	Number of Recorded Crimes per 100,00 Population		Number of intentional homicides per 100,000 population*[f]
Population	**Population Change**	Population of Urban Formal and Informal Settlements		
		Population Growth Rate		Population growth in rural and urban areas [g]
				Dependency ratio [h]
		ENVIRONMENTAL		
Theme	***Sub-theme***	***CSD Indicators***	***MD Indicator***	***New Indicators***
Atmosphere	**Climate Change**	Emissions of Greenhouse Gases	**28.** Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)	
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances	**28.** Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs (ODP tons)	

[e] Proposed by WHO as additional indicator.
[f] Proposed by UNODC as alternative to Number of recorded Crimes.
[g] Proposed by CIESIN as additional indicator.
[h] Proposed by DESA-DSD as additional indicator

Atmosphere	**Air Quality**	Ambient Concentration of Air Pollutants in Urban Areas		
Land	**Agriculture**	Arable and Permanent Crop Land Area		
		Use of Fertilizer		
		Use of Agricultural Pesticides		
	Forests	Forest Area as a Percent of Land Area	**25.** Proportion of land area covered by forest	
		Wood Harvesting Intensity		
				Forest governance [i]
	Desertification	Land Affected by Desertification		
	Urbanization	Area of Urban Formal and Informal Settlements		
Oceans, Seas and Coasts	**Coastal Zone**	Algae Concentration in Coastal Waters		
		Percentage of Total Population Living in Coastal Areas		
	Fisheries	Annual Catch by Major Species		
	Marine environment [i]			
Fresh Water	**Water Quantity**	Annual Withdrawal of Ground and Surface as Percent of Total Available Water		
	Water Quality	BOD in Water Bodies		
		Concentration of Faecal Coliform in Freshwater		
Biodiversity	**Ecosystem**	Protected Area as a Percent of Total Area	**26.** Ratio of area protected to maintain biological diversity to surface area	
				Effectiveness of management of protected areas [i]
				Coverage of protected areas by biome and habitat [i]
		Area of Selected Key Ecosystems		Percentage of selected ecosystem under sustainable management programmes [i]

[i] Proposed by IUCN as additional indicator.

Biodiversity	**Species**	Abundance of Selected Key Species		
				Assessment of threatened species [i]
		ECONOMIC		
Theme	***Sub-theme***	***CSD Indicators***	***MD Indicators***	***New Indicators***
Economic Structure	**Economic performance**	GDP per Capita		
		Investment Share in GDP		
				Inflation [k]
	Tourism [l]			
	Trade	Balance of Trade in Goods and Services		Current account deficit as percentage of GDP * [n]
			38. Proportion of total developed country imports (by value and excluding arms) from developing countries and from LDCs, admitted free of duty	Share of imports from developing countries and from LDCs [k]
			39. Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries	
			40. Agricultural support estimate for OECD countries as percentage of their GDP	
			41. Proportion of ODA provided to help build trade capacity	
	Financial Status	Total Official Development Assistance (ODA) given or received as a percentage of GNP	**33.** Net ODA, total and to LDCs, as percentage of OECD/Development Assistance Committee (DAC) donors' gross national income (GNI)	
			34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)	

[k] Proposed by DESA-DSD as additional indicator.
[l] Proposed by DESA-SD as additional sub-theme.
[n] Proposed by DESA-DSD as alternative to trade balance.

Economic Structure	**Financial Status**		**35.** Proportion of bilateral ODA of OECD/DAC donors that is untied	
			36. ODA received in landlocked developing countries as a proportion of their GNIs	
			37. ODA received in small island developing States as proportion of their GNIs	
		Debt to GNP ratio	**44.** Debt service as a percentage of exports of goods and services	
			42. Total number of countries that have reached their Heavily Indebted Poor Countries Initiative (HIPC) decision points and number that have reached their HIPC completion points (cumulative)	
			43. Debt relief committed under HIPC initiative	
				Net FDI inflows and outflows as percentage of GNI [o]
				Remittances as percentage of GNI [o]
Consumption and Production Patterns	**Material Consumption**	Intensity of Material Use		
	Energy Use	Annual Energy Consumption per Capita		
		Share of Consumption of Renewable Energy Sources		
		Intensity of Energy Use	**27.** Energy use (kg oil equivalent) per $1 GDP (PPP)	
			29. Proportion of population using solid fuels	Share of households without access to electricity or commercial energy [o]
	No CSD-ISD sub-theme applicable			Land area dedicated to sustainable bioenergy production [p]

[o] Proposed by DESA-DSD as additional indicator.
[p] Proposed by FAO as additional indicator

Consumption and Production Patterns	**Waste Generation and Management**	Generation of Industrial and Municipal Solid Waste		
		Generation of Hazardous Waste		
		Management of Radioactive Waste		Ratio of solid radioactive waste awaiting disposal to total solid radioactive waste generated [q]
		Waste Recycling and Reuse		
	Transportation	Distance Travelled per Capita by Mode of Transport		
		INSTITUTIONAL		
Theme	***Sub-theme***	***CSD Indicators***	***MD Indicator***	***New Indicators***
Institutional Framework	**Strategic Implementation of SD**	National Sustainable Development Strategy		
	International Cooperation	Implementation of Ratified Global Agreements		
Institutional Capacity	**Information Access**	Number of Internet Subscribers per 1000 Inhabitants	**48.** Personal computers in use per 100 population and Internet users per 100 population	
	Communication Infrastructure	Main Telephone Lines per 1000 Inhabitants	**47.** Telephone lines and cellular subscribers per 100 population	
	Science and Technology	Expenditure on R&D as a Percent of GDP		
	Disaster Preparedness and Response	Economic and Human Loss Due to Natural Disasters		
	Vulnerability to Natural Hazards			Percentage of population living in disaster prone areas [r]
	Good governance [s]			

[q] Proposed by UNSD as alternative to Management of Radioactive Waste
[r] Proposed by UNISDR as additional indicator.
[s] Proposed by Eurostat as additional sub-theme

Annex 1: Revised Methodology Sheets for Indicators on Social Issues

UNEMPLOYMENT RATE		
Social	**Equity**	**Poverty**

1. INDICATOR

(a) **Name:** Unemployment Rate.

(b) **Brief Definition:** Unemployment rate is the ratio of unemployed people to the labour force.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social / Equity / Poverty.

2. POLICY RELEVANCE

(a) **Purpose:** The unemployment rate measures an important part of the unutilized labour supply of a country. If employment is viewed as the desired portion of the economically active population (labour force), unemployment can been seen as, for the most part, the undesirable portion (although some short-term unemployment may be unavoidable). Unemployment rates by specific groups- such as by age, sex, occupation or industry- are also useful statistics in identifying groups of workers and sectors most vulnerable to joblessness.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Unemployment is useful and relevant to measuring sustainable development, especially if uniformly measured over time, and considered with other socio-economic indicators. It is one of the main reasons for poverty in rich and medium income countries and among persons with high education in low-income countries (no work, no income but compensation from insurance schemes or other welfare state systems whenever they exist). It should be noted, however, that it is common to find people working full-time but remaining poor due to the particular social conditions, low earnings, and type of industrial relations prevalent in their country, industry, or occupation.

(c) **International Conventions and Agreements:** The measures of unemployment and the labour force are defined for statistical purposes in the International Labour Office (ILO): Resolution concerning statistics of the economically active population, employment, unemployment and underemployment, adopted by the Thirteenth International Conference of Labour Statisticians, Geneva, 1982. The ILO Convention concerning Employment Promotion and Protection against Unemployment, 1988 (No. 168) provides for coordination between systems of protection against unemployment and employment policy.

(d) **International Targets/Recommended Standards:** There are no international targets regarding the rate of unemployment.

(e) **Linkages to Other Indicators:** The indicator is one among many that measure utilization or underutilization of labour and the performance of labour markets. Other measurements focus on

parts of the unemployment experience: youth unemployment, long-term unemployment, unemployment by educational attainment, time-related underemployment (partial unemployment), discouraged workers and other groups of economically inactive persons marginally attached to the labour market and forming part of the potential supply of labour.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The definitions for labour force, employed persons, and unemployed persons are well established by international agreements (see section 6 below).

i) *Labour Force:* The currently active population or labour force has two components: employed and unemployed persons. The international standard definition of labour force established by the Thirteenth International Conference of Labour Statisticians (International Labour Office (ILO), 1982) is based on the following elements:

-- *The survey population:* All usual residents (de jure population) or all persons present in the country at the time of the survey (de facto population). In practice, some particular groups, such as members of the armed forces or other persons living in institutions, nomadic people, etc., may be excluded.

-- *An age limit:* In countries, where compulsory schooling and legislation on the minimum age for admission to employment have broad coverage and are widely respected, the age specified in these regulations may be used as a basis for determining an appropriate minimum age limit for measuring the economically active population.

In other countries, the minimum age limit should be determined empirically on the basis of (i) the extent and intensity of participation in economic activities by young people, and (ii) the feasibility and cost of measuring such participation with acceptable accuracy. Some countries also determine a maximum age for inclusion in the labour force, although the international standards do not recommend the use of a maximum age limit..

-- *The involvement in economic activities (or availability for such involvement) during the survey reference period:* The concept of economic activity, or employment, adopted by the Thirteenth International Conference of Labour Statisticians (1982) is defined in terms of production of goods and services as set forth by the United Nations System of National Accounts (revised in 1993).

-- *A short reference period:* For example, one week or a day.

ii) *Employed persons:* According to the 1982 international definition of employment (ILO, 1983) the employed comprise all persons above the age specified for measuring the labour force, who were in the following categories:

-- *Paid employment:* (i) at work: persons who, during the reference period, performed some work (at least one hour) for wage or salary, in cash or in kind; (ii) with a job but not at work: persons who, having already worked in their present job, were temporarily not at work during the reference period but had a formal attachment to their job;

-- *Self-employment:* (i) at work: persons who, during the reference period, performed some work (at least one hour) for profit or family gain, in cash or in kind; (ii) with an enterprise but not at work: persons with an enterprise, which may be a business enterprise, a farm or a service undertaking, who were temporarily not at work during the reference period for some specific reason.

iii) *Unemployed persons:* According to the 1982 international standard definition of unemployment (ILO, 1983) the unemployed comprise all persons above the age specified for measuring the labour force, who during the survey reference period were at the same time: (i) not in paid employment or self-employment, not even for an hour; (ii) available for work; and (iii) seeking work, i.e. had taken specific steps in a specified recent period (e.g. the last four weeks) to seek paid employment or self-employment.

(b) **Measurement Methods:** Household or labour force surveys are generally the most comprehensive and comparable sources for unemployment statistics. Other sources include population censuses, employment office records and official estimates. In many countries, data based on registration at employment offices understate unemployment, in comparison with household or labour force surveys, because not all persons who are looking for work register on account of eligibility requirements, which may exclude those who have never worked or have not worked in a recent period, or because persons looking for work prefer to use other means to find jobs. In other countries, particularly those where registration at employment offices is a requirement for receiving unemployment benefits, registration data sometimes overstate unemployment, because of not all persons registered as job seekers are without any work, currently available for work or actually seeking work). Official estimates are often based on a combination of sources. Population censuses generally do not probe deeply into labour force status, resulting in magnitudes of unemployment that may differ substantially (either higher or lower) from those obtained from household surveys where more questions are asked.

(c) **Limitations of the Indicator:** As important as the unemployment rate is, it should not be interpreted as a measure of economic hardship. Doing so can produce some unfortunate results, giving unemployment a greater degree of significance than it deserves. The unemployment rate, if based on the internationally recommended standards, simply tells us the proportion of the labour force that does not have a job but is available and actively looking for work. It says nothing about the economic resources of the unemployed worker or the worker's family. The scope of unemployment should therefore be limited to its use as a measure of the underutilization of labour and an indicator of the labour market situation. Broader measures, including income-related indicators, are needed to evaluate economic hardship.

Low unemployment rates may well occur in spite of substantial poverty in a country, whereas high unemployment rates can occur in countries with significant economic development and low incidences of poverty. In countries without a safety net of unemployment insurance and welfare benefits, many individuals simply cannot afford to be unemployed for a longer time period. Instead they eke out a living in the informal sector. In countries with well-developed social protection schemes, however, workers may be able to afford to take the time to find more desirable jobs.

(d) **Status of the Methodology:** Well developed and employed although discrepancies do occur.

In an effort to resolve the international comparability issue for its member-countries and building on work carried out by the United States Bureau of Labor Statistics in the 1960's, the Organization for Economic Co-operation and Development (OECD) initiated research on and has published "standardized unemployment rates" adjusted to the International Labour Office (ILO) concepts. The ILO extended the process even further, beginning in 1990. The ILO-comparable unemployment rates show historical data for 30 countries, areas and territories (disseminated in ILO *Bulletin of Labour Statistics*, 2004-4 and available on the ILO statistical Website: http://laborsta.ilo.org). The tables present unemployment rates from national labour force surveys that have been adjusted to make the estimates conceptually consistent with the strictest application of the ILO international statistical guidelines on labour statistics. This implies that participating countries must be able to provide detailed information on the composite elements of their labour force. At the same time, the unemployment rates obtained are in conformity with the OECD's programme of standardized rates, which itself is based on the ILO standards. This avoids a proliferation of "international" estimates, which might not be the same. Further, all the data are expressed in terms of annual averages (or a period that is currently considered to be the most representative over the year), thereby avoiding the variances that could occur if different reference periods were observed. These estimates, based on official national data, should provide the best basis currently available for making reasonable international comparisons and assumptions, although they may still contain very minor discrepancies.

(e) **Alternative Definitions/Indicators:**

As the extent to which unemployment affects people varies among different population groups, breakdowns of the indicator by sex, broad age groups, educational level, etc. could be considered. It would also be useful to complement the indicator with supplementary measures of labour underutilization, which include time-related underemployment and other forms of inadequate employment, as well as discouraged workers and other economically inactive persons marginally attached to the labour market, who form part of the potential supply of labour.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Labour force (total number of persons) and total number of unemployed persons, preferably derived from the same survey.

(b) **National and International Data Availability and Sources:** Unemployment rate data are available for a total of 131 countries, most of which are broken down by gender, on the ILO LABORSTA Web site and in the ILO *Yearbook of Labour Statistics*, with the majority of data resulting from household or labour force surveys, and the remainder from employment office records, official estimates or population censuses.

(c) **Data References:** The data repositories used are International Labour Office (ILO), LABORSTA database and OECD Labour Force Statistics.. For seven countries, data were taken from national sources.

5. AGENCIES INVOLVED WITH THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the International Labour Office (ILO), located in Geneva. The contact point is the Bureau of Statistics, ILO; e-mail: stat@ilo.org, tel: (+41) 227998631, fax: (+41) 227996957.

(b) **Other Contributing Organizations:** None.

6. REFERENCES

(a) **Readings:**

Yearbook of Labour Statistics (ILO, Geneva).

Bulletin of Labour Statistics (biannual) (ILO, Geneva).

Statistical yearbooks and other publications issued by the national statistical offices.

Surveys of Economically Active Population, Employment, Unemployment and Underemployment -An ILO Manual on Concepts and Methods (ILO, Geneva, 1992).

Sources and Methods: Labour Statistics, Volume 3 - Economically active population, employment, unemployment and hours of work (household surveys), third edition (ILO, Geneva, 2004).

Sources and Methods: Labour Statistics, Volume 4- Employment, unemployment, wages and hours of work (administrative records and related sources), second edition (ILO, Geneva, 2004).

Sources and Methods: Labour Statistics, Volume 5- Total and economically active population, employment and unemployment (population censuses), second edition (ILO, Geneva, 1996) (third edition under preparation).

ILO-comparable annual employment and unemployment estimates, in *Bulletin of Labour Statistics*, 2004-4 (ILO, Geneva, 2004)

System of National Accounts 1993 (Commission of the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, Brussels / Luxembourg, New York, Paris, Washington, D.C., 1993)

Current international recommendations on labour statistics (ILO, Geneva, 2000). See in particular: *Resolution concerning Statistics of the Economically Active Population, Employment, Unemployment and Underemployment*, adopted by the Thirteenth International Conference of Labour Statisticians (October 1982).

(b) **Internet sites:**

International Labour Office, Bureau of Statistics: the ILO's statistical database on labour statistics, including unemployment data and ILO-comparable estimates:

http://laborsta.ilo.org

International recommendations on labour statistics, including the resolution concerning statistics of the economically active population, employment, unemployment and underemployment:

http://www.ilo.org/public/english/bureau/stat/res/index.htm

Key Indicators of the Labour Market, Geneva, 2003 (available on CD-ROM; sample tables on web site):

http://www.ilo.org/public/english/employment/strat/kilm/

RATIO OF AVERAGE FEMALE WAGE TO MALE WAGE		
Social	**Equity**	**Gender Equality**

1. INDICATOR

(a) **Name:** Ratio of average female wage to male wage.

(b) **Brief Definition:** Obtained as the quotient of average wages paid to female and male employees at regular intervals for time worked or work done.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social / Equity / Gender Equality.

2. POLICY RELEVANCE

(a) **Purpose:** To assess the remuneration offered to women vis-à-vis their male counterpart to ultimately determine the level of the reward of women's participation in the economy.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** The lower the ratio of wages offered to women, the less the attraction there may be for women to join the labour force, which in turn deprives the economy of a vital component of development. This disadvantage could also be attributed to a number of reasons such as inequalities in educational opportunities for women and the need for policy makers to correct this inequity. It is generally acknowledged that, if women are more educated, they are more likely to contribute to the broader productivity of society while enhancing child and maternal health and welfare. Other reasons include the feminisation of certain occupations and sectors, which in turn tends to lower the level of wages; or the fact that women may devote less energy and time to market work because they must devote more energy and time to household responsibilities. Policy makers should endeavour to correct these disparities, end gender-based inequalities and integrate women in all development activities.

(c) **International Conventions and Agreements:** .Four key ILO Conventions on gender equality: Equal Remuneration Convention, 1951 (No. 100); Discrimination (Employment and Occupation) Convention, 1958 (No. 111); Workers with Family Responsibilities Convention, 1981 (No. 156) and the Maternity Protection Convention, 2000 (No. 183). A number of additional Conventions also make reference to gender equity issues.

(d) **International Targets/Recommended Standards:** Eliminate discriminatory practices in employment (Beijing).

(e) **Linkages to Other Indicators:** The indicator has close linkages with the unemployment rate indicator because both deal with employment as a principal generator of production. It is also closely linked to indicators pertaining to education and poverty.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** There are two international sources of definitions and concepts:

(i) The concept of earnings, as applied in wages statistics, relate to remuneration in cash and in kind paid to employees, usually at regular intervals, for time worked; or work done together with remuneration for time not worked, such as for annual vacation, other paid leave or holidays. Earnings relate to employees' gross remuneration, i.e. the total before any deductions are made by the employer in respect of taxes, contributions of employees to social security and pension schemes, life insurance premiums, union dues and other obligations of employees. Wage rates, as part of earnings, include basic wages, cost-of-living allowances and other guaranteed and regularly paid allowances, but exclude overtime payments, bonuses and gratuities, family allowances and other social security payments made by employers. *Ex gratia* payments in kind, supplementary to normal wage rates are also excluded (International Labour Office).

(ii) Wages and salaries, as part of compensation to employees, are payable in cash or in kind and include the values of any social contributions, income taxes, etc. payable by the employee even if they are actually withheld by the employer for administrative convenience or other reasons and paid directly to social insurance schemes, tax authorities, etc. on behalf of the employee. Wages and salaries in cash include payments at regular intervals, supplementary allowances payable regularly, payments to employees away from work for short periods such as holidays, and ad hoc bonuses linked to performance, commissions, gratuities and tips (UN System of National Accounts (SNA)).

(b) **Measurement Methods:** The indicator is measured by taking the average wages (wage rates or earnings) per hour, day, week or month received by female employees as a ratio of the corresponding average wages for males. It can be classified further according to major divisions of economic activity, for example, agriculture, mining and quarrying, manufacturing, etc., to facilitate the measurement of the sectoral impact on the development process. Similarly, breakdowns according to age classes would provide additional information related to sustainable development trends; however, statistics on average wages for different age groups are scarce. Classification by occupational group (e.g. according to the nine major groups of ISCO-88) is more common, and would also be useful.

(c) **Limitations of the Indicator:**

This indicator is subject to a number of limitations which affect its quality and relevance. The major ones include the following aspects:

When this ratio is calculated at the level of the national economy, or even at the sectoral level (by division of economic activity), it does not take into account any of the basic factors required for an analysis of wage differentials by sex, such as the employment and occupational structure within the activity (i.e. the relative importance of men and women, skilled and unskilled labour, full- and part-time workers, etc.), occupation, level of education and training, experience and seniority, etc. Typically, women receive less pay than men everywhere and this is partly due to the fact that women often hold lower-level, lower-paying positions in female-dominated jobs. A more refined analysis

should be made on the basis of occupational wages – at least at the major group level of occupational classifications, or, better, at the level of individual occupations.

A second limitation is due to the concept of wages used. A key question is whether data should relate to wage rates or earnings and there is no universally accepted best or optimal answer. Wage rates correspond to the basic remuneration paid for an occupation in a given activity. Earnings usually include overtime and fringe benefits, premiums and allowances. Gender differentials in earnings tend to be higher than gender differentials in wage rates.

Part of the differential between women's and men's wages depends on differences in hours worked per unit of time (whether day, week or month). Obviously, daily, weekly and monthly earnings are dependent on variations in hours of work and the fact that men tend to work more hours than women may be an important explanatory factor of the gender gap. Even for hourly earnings, a heavier concentration of women in part-time / part-year jobs might explain part of the difference in earnings, since part-time / part-year jobs usually pay less than comparable full-time / full-year jobs.

Thus, ideally, measures of gender wage differentials should be based on hourly wage rates or earnings by occupation, covering full-time / full-year employees. Unfortunately, such a measure is far from being available for the majority of countries.

Finally, it should be noted that the quality and comprehensiveness of the statistics of average wages used to compile this indicator vary significantly between countries. Various sources may be used: most of the currently available statistics are derived from establishments surveys or administrative sources and are limited to the wages of employees engaged in the formal / modern sector of the economy, often only in larger establishments, e.g. excluding those with fewer than five or ten employees. These restrictions do not apply to the statistics derived from labour force / household sample surveys which may also cover the employment-related earnings / income of the self-employed. In all cases, persons engaged in household activities providing services for own consumption are classified as outside the production boundary in the SNA and therefore are not covered by this indicator.

(d) **Status of the Methodology:** The ILO resolution on an Integrated System of Wages Statistics, including earnings and wage rates, was adopted by the Twelfth International Conference of Labour Statisticians in Geneva in 1973.

(e) **Alternative Definitions/Indicators:** An alternative indicator to the male-female wage ratio could be the percentage contribution of women to GDP which measures activities in the production boundary that incorporate the contribution of women in the economic process as proposed in the 1993 SNA. Other alternative indicators could include the employment distribution by gender and occupation / occupational group (source: labour statistics) that measures the share of women in employment and the extent of occupational segregation; the distribution of employees by sex and ranges of hourly, monthly or yearly earnings; the percentage of men and women whose earnings are below a given percentage (e.g. 60%) of median earnings; similar indicators separately in the formal and informal economy; etc.. Yet an additional alternative indicator could be the number of elected women in positions in government as % of total elected, which measures gender equality through female participation in political decision making (Source: national election statistics).

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The mean and/or median wages paid to female and male employees provide the basic information to compile this indicator.

(b) **National and International Data Availability and Sources:** The data are mainly reported by departments or ministries of labour and national statistical offices in most countries. It is obtained either through questionnaires or surveys from the different economic sectors of the economy. Average earnings are usually derived from payroll data supplied by a sample of establishments together with data on hours of work and on employment. Occasionally, wages indices are reported in the absence of absolute wage data. In some other cases, information is compiled on the basis of labour force/household sample surveys and administrative records (such as social insurance statistics).

(c) **Data References:** Data are published by the ILO in the Yearbook of Labour Statistics. The statistics are also available on Internet at: http://laborsta.ilo.org.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the International Labour Office (ILO). The contact point is the Bureau of Statistics; e-mail: stat@ilo.org; tel: (+41) 227998632; fax: (41 22) 799 69 57.

(b) **Other Contributing Organizations:** None.

6. REFERENCES

(a) **Readings:** The full text of the ILO resolution listed in section 3e above can be found in *Current International Recommendations on Labour Statistics* (ILO, Geneva, 2000), ; also available on the Bureau of Statistics' website at: http://www.ilo.org/stat.

Further information can be obtained from another ILO publication: *An Integrated System of Wages Statistics: A Manual on Methods* (ILO, Geneva 1979).

National methodologies are described in: *Sources and Methods: Labour Statistics*; Vol. 2 *Employment, Wages, Hours of Work and Labour Cost* (Establishment Surveys) (second edition, ILO, Geneva 1995); Vol. 4 *Employment, Unemployment, Wages and Hours of Work* (Administrative Records and Related Sources) (second edition, ILO, Geneva 2004).

(b) **Internet site:** International Labour Office, Bureau of Statistics : http://www.ilo.org/stat; LABORSTA database on labour statistics available at : http://laborsta.ilo.org.

NUTRITIONAL STATUS OF CHILDREN		
Social	**Health**	**Nutritional Status**

1. INDICATOR

(a) **Name:** Nutritional Status of Children.

(b) **Brief Definition:** Percentage of underweight-for-age below -2 standard deviation (SD) of the National Center for Health Statistics (NCHS) / WHO reference median) among children under five years of age; and percentage of stunting (height-for-age below -2 SD of the National Center for Health Statistics (NCHS) / WHO reference median) among children under five years of age.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social Equity / Health / Nutritional Status.

2. POLICY RELEVANCE

(a) **Purpose:** The purpose of this indicator is to measure long term nutritional imbalance and malnutrition, as well as current under-nutrition.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Health and development are intimately interconnected. Meeting primary health care needs and the nutritional requirement of children are fundamental to the achievement of sustainable development. Anthropometric measurements to assess growth and development, particularly in young children, are the most widely used indicators of nutritional status in a community. The percentage of low height-for-age reflects the cumulative effects of under-nutrition and infections since birth, and even before birth. This measure, therefore, should be interpreted as an indication of poor environmental conditions and / or early malnutrition. The percentage of low weight-for-age reflects both the cumulative effects of episodes of malnutrition or chronic under-nutrition since birth and current under-nutrition. Thus, it is a composite indicator which is more difficult to interpret.

(c) **International Conventions and Agreements:** The United Nations World Summit for Children and the Millennium Development Goals represent international agreements relevant to this indicator.

(d) **International Targets/Recommended Standards:** To half the prevalence of underweight among children younger than 5 years between 1990 and 2015. This target of the Millennium Development Goal No. 1 to "eradicate extreme poverty and hunger" has been established at the Millennium Summit in 2000, where representatives from 189 countries committed themselves to give highest priority to sustaining development and eliminating poverty.

(e) **Linkages to Other Indicators:** This indicator is closely linked with adequate birth weight. It is also associated with such socioeconomic and environmental indicators as squared poverty gap index, access to safe drinking water, infant mortality rate, life expectancy at birth, national health expenditure

devoted to local health care, Gross Domestic Product (GDP) per capita, environmental protection expenditures as a percent of GDP, and waste water treatment coverage.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** A national or international reference population is used to calculate the indicator prevalences for low weight-for-age and low height-for-age. A WHO Working Group has recommended that the best available data for this has been established by the United States National Center for Health Statistics (see references in section 6 below). This data may be used for children up to five years of age, since the influence of ethnic or genetic factors on young children is considered insignificant.

Low weight and low height are defined as less than two standard deviations below the median of the international reference population (see WHO, 1995 in section 6 below).

(b) **Measurement Methods:** The proportion of children under five with low weight-for-age and low height-for-age can be calculated by using the following formula:

% underweight children = (Numerator / denominator) x 100

Numerator: number of children under five with weight-for-age below -2 SD

Denominator: total number of children under five weighed.

% stunted children = (Numerator / denominator) x 100

Numerator: number of children under five with height-for-age below -2 SD

Denominator: total number of children under five measured.

For height, supine length is measured in children under two, and stature height in older children.

(c) **Limitations of the Indicator:** Lack of specificity when using anthropometry to assess nutritional status, as changes in body measurements are sensitive to many factors including intake of essential nutrients, infections, altitude, stress and genetic background.

In some countries, the age of children is difficult to determine. It is also difficult to measure the length of young children, particularly infants with accuracy and precision.

(d) **Status of the Methodology:** Published as article. de Onis M and Blössner M. The WHO Global Database on Child Growth and Malnutrition: methodology and applications. *International Journal of Epidemiology* 2003;32:518-26.

(e) **Alternative Definitions/Indicators:** Not Available.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The data needed to compile this indicator are the number of children under five weighed and measured; and the number of children under five with weight-for-age and height-for-age falling below -2 SD of the sex and age-specific international reference median values.

(b) **National and International Data Availability and Sources:** The data are routinely collected by ministries of health at the national and subnational levels for most countries. Other sources are: Demographic and Health Surveys (DHS, www.measuredhs.com); Multiple Indicators Cluster Surveys (MICS, www.childinfo.org); Living Standards Measurement Surveys (LSMS, www.worldbank.org/lsms/). Data are being collected and standardized by the WHO Department of Nutrition and disseminated via the WHO Global Database on Child Growth and Malnutrition web site www.who.int/nutgrowthdb.

(c) **Data References:** Available via the WHO Global Database on Child Growth and Malnutrition web site www.who.int/nutgrowthdb

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Health Organization (WHO). At WHO, the contact point is the Director, Department of Nutrition for Health and Development; fax no. (41 22) 791 3111.

(b) **Other Contributing Organizations:** UNICEF.

6. REFERENCES

(a) **Readings:**

Physical Status: The Use and Interpretation of Anthropometry. Report of a WHO Expert Committee. Geneva, World Health Organization, 1995 (WHO Technical Report Series, No. 854).

Food and Nutrition Bulletin Supplement 1: The WHO Multicentre Growth Reference Study (MGRS): Rational, planning, and implementation. de Onis M, Garza C, Victora CG, Bhan MK, Norum KR (eds). *Food and Nutrition Bulletin* 2004;25: S3-S89.

Field guide on rapid nutritional assessment in emergencies. Alexandria: World Health Organization Regional Office for the Eastern Mediterranean, 1995.

WHO Global Database on Child Growth and Malnutrition (WHO/NUT/97.4). Geneva, World Health Organization, 1997.

A Guide to Nutritional Assessment. Geneva, World Health Organization, 1988.

(b) **Internet site:** WHO Global Database on Child Growth and Malnutrition http://www.who.int/nutgrowthdb

MORTALITY RATE UNDER 5 YEARS OLD		
Social	**Health**	**Nutritional Status**

1. INDICATOR

(a) **Name:** Mortality Rate Under 5 Years Old.

(b) **Brief Definition:** Under-5 mortality refers to the probability of dying before age 5, per 1,000 newborns.

(c) **Unit of Measurement:** Per thousand live births.

(d) **Placement in the CSD Indicator Set:** Social / Health / Mortality.

2. POLICY RELEVANCE

(a) **Purpose:** This indicator measures the risk of dying in infancy and early childhood.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** The reduction of childhood mortality is one of the most strongly and universally supported development goals. In high-mortality settings, a large fraction of all deaths occur at ages under 5 years. Despite considerable progress in reducing child mortality, there remains a large gap between more- and less-developed countries in risks of dying before the age of 5 years: for instance, during 2000-2005, under-5 mortality stood at 10 per thousand in the more developed regions but at 160 per thousand in the least developed countries (DESA, *World Population Prospects: The 2004 Revision*). The gap between more- and less- developed countries is larger in proportional terms for death rates in early childhood than during the adult ages. Under-5 mortality levels are influenced by poverty; education, particularly of mothers; the availability, accessibility and quality of health services; health risks in the environment, such as access to safe water and sanitation; and nutrition, among other factors.

(c) **International Conventions and Agreements:** Quantitative goals for the reduction of under-5 mortality rates were adopted at many international conferences and summits during the 1990s and 2000s, including, among others, the World Summit for Children (1990), the International Conference on Population and Development (1994) the 1995 Fourth World Conference on Women (1995) and the World Summit for Social Development (1995) The United Nations Millennium Declaration, adopted in 2000, identified a goal of reducing under-5 mortality by two thirds between 2000 and 2015 (A / RES / 55 / 2, para. 19). The Programme of Action of the International Conference on Population and Development further encouraged countries with intermediate mortality levels to achieve an under-5 mortality rate below 60 deaths per 1,000 births by the year 2005, and all countries to achieve an under-5 mortality rate below 45 per 1,000 live births by 2015. The under-5 mortality rate is currently one of the indicators included in the Human Assets Index, which is among the quantitative criteria for the identification of least developed countries within the United Nations. Many other international agreements, including Agenda 21, also refer to the general goal of reducing childhood mortality.

(d) **International Targets/Recommended Standards:** See section 2(c) above.

(e) **Linkages to Other Indicators:** This indicator is closely related to life expectancy at birth. It is more generally connected to many other social and economic indicators, including those listed in section 3b above.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Standard statistical definitions of the terms "live birth" and "death" are put forth in the United Nations *Principles and Recommendations for a Vital Statistics System* (para. 46):

LIVE BIRTH is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which after such separation breathes or shows any other evidence of life such as beating of the heart, pulsation of the umbilical cord, of definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live-born regardless of gestational age.

DEATH is the permanent disappearance of all evidence of life at any time after live birth has taken place (post-natal cessation of vital functions without capability of resuscitation).

(b) **Measurement Methods:** The under-5 mortality rate is derived from estimates of births and deaths gathered in vital statistical systems, censuses and surveys. Where data on deaths and births are complete, or adjustments for age misstatement and incompleteness can be made, the under-5 mortality rate can be calculated directly. The details can be found in demographic or actuarial references that describe construction of life tables, for example, Pressat (1972) or Shryock and Siegel (1980). When such data are unavailable from registration systems or maternity history data in sample surveys, the under-5 mortality rate can be calculated through indirect or modelling methods based on special questions asked in censuses or demographic surveys. For information on these estimates see the Manual X and MORTPAK references listed in section 6 below.

(c) **Limitations of the Indicator:** There are often problems in collecting the information required for calculating the under-5 mortality rate in less developed countries where routine data collection in the health services may omit many infant and child deaths. Some countries do not follow the standard definition, given above, of "live birth". However, adjustments can sometimes be made for incomplete registration and age misstatement, and in many developing countries maternity-history data gathered in nationally representative sample surveys provide a sound basis for estimating levels and trends of under-5 mortality. Sample surveys have been more successful at obtaining estimates of under-5 mortality than of adult mortality, and because of this, information about mortality of young children is currently substantially more complete and more timely than is information about the mortality of adults.

If the necessary data are available, the rate can be calculated separately for boys and girls, and for geographic and social subgroups (based on parents' characteristics). It is also useful to disaggregate the under-5 period into separate rates for under age one (infant mortality rate) and for ages 1-4 years.

(d) **Status of the Methodology:** Well developed and widely employed.

(e) **Alternative Definitions/Indicators:** The infant mortality rate is another indicator of early child mortality for which quantitative goals have been set forth at recent international conferences. The infant mortality rate is the number of deaths under 1 year of age during a period of time per 1000 live-births during the same period.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The under-5 mortality rate is derived from data on births and deaths occurring under the age of 5 years, as described in section 3(b) above.

(b) **National and International Data Availability and Sources:** Data are now available for most countries thanks to special surveys of representative samples of the population whenever vital registration systems are not available. Surveys that rely on maternity histories, in which women are asked to give the date of birth and age of death (if applicable) of each live-born child, are used in many household surveys, but care must be taken to avoid age misreporting and to ensure that there is a complete report of deaths. Retrospective questions about the survival of all children born included in censuses and surveys, and analyses using indirect estimation procedures, are also considered to be reliable sources.

(c) **Data References:** Original data sources include vital registration, sample registration systems, surveillance systems, censuses, and demographic surveys. Information needed for this indicator is collected by the United Nations on a regular basis. For all countries, survey and registration data are evaluated and, if necessary, adjusted for incompleteness by the Department of Economic and Social Affairs (DESA) Population Division as part of its preparations of the official United Nations population estimates and projections. Recent past, current and projected estimates of infant mortality are prepared for all countries by the Population Division; DESA and appear in the United Nations publication, *World Population Prospects: The 2004 Revision*. Estimates by the United Nations Children's Fund (UNICEF) are published in the annual *State of the World's Children* reports. Demographic monitoring done by government statistical offices often allows desegregation of information to show differences within countries. Surveys are generally designed to provide estimates for major regions within countries as well as at the national level.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Department of Economic and Social Affairs. The contact point is the Director, Population Division, fax no. (1 212) 963 2147.

(b) **Other Contributing Organizations**: The United Nations Statistics Division / DESA; and the United Nations Children's Fund (UNICEF); and the World Health Organization (WHO).

6. REFERENCES

(a) **Readings:**

Pressat, R. *Demographic Analysis: Methods, Results, Applications.* London, Edward Arnold; Chicago, Aldine Atherton. 1972.

Shryock, H.S, and J.S.Siegel. *The Methods and Materials of Demography*. U.S. Government Printing Office, Washington, D.C. 1980.

DESA, Population Division. *Manual X: Indirect Techniques for Demographic Estimation*. United Nations Sales No. E. 83.XIII.2, New York, 1983.

DESA, Population Division, *MORTPAK for Windows - The United Nations Software Package for Demographic Measurement,* CD-ROM (United Nations, New York, 2003).

DESA, Population Division, *World Population Prospects: The 2004 Revision. Vol. I. Comprehensive Tables* (United Nations publication, ST/ESA/SER.A/244, New York, forthcoming).

Hill K. Approaches to the measurement of childhood mortality: A comparative review. *Population Index* 57(3):368-382, Fall, 1991.

United Nations. *Principles and Recommendations for a Vital Statistics System*. United Nations publication, Sales No. E.73.XVII.9.

UNICEF. *The State of the World's Children. 2005.*

DESA, Statistics Division, *Demographic Yearbook 2001*, (United Nations Sales No. 03.XIII.1, 2004).

(b) **Internet sites:**

Statistics are available at:

http://www.un.org/esa/population/unpop.htm

http://millenniumindicators.un.org/unsd/mi/mi_goals.asp

LIFE EXPECTANCY AT BIRTH		
Social	**Health**	**Nutritional Status**

1. INDICATOR

(a) **Name:** Life Expectancy at Birth.

(b) **Brief Definition:** The average number of years that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates of a given period.

(c) **Unit of Measurement:** Years of life.

(d) **Placement in the CSD Indicator Set:** Social / Health / Mortality.

2. POLICY RELEVANCE

(a) **Purpose:** Measures how many years on average a new-born baby is expected to live, given current age-specific mortality risks. Life expectancy at birth is an indicator of mortality conditions and, by proxy, of health conditions.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Mortality, with fertility and migration, determines the size of human populations, their composition by age, sex, and ethnicity, and the population's potential for future growth. Life expectancy, a basic indicator, is closely connected with health conditions, which are in turn an integral part of development. The International Conference on Population and Development (ICPD) Programme of Action notes that the unprecedented increase in human longevity reflects gains in public health and in access to primary health-care services (paragraphs 8.1 and 8.2), which Agenda 21 recognizes as an integral part of sustainable development and primary environmental care (paragraph 6.1). The ICPD Programme of Action highlights the need to reduce disparities in mortality and morbidity among countries and between socio-economic and ethnic groups. It identifies the health effects of environmental degradation and exposure to hazardous substances in the work-place as issues of increasing concern. Life expectancy is included as a basic indicator of health and social development in, among others, the Minimum National Social Data Set endorsed by the United Nations Statistical Commission at its 29th session in 1997, the UNDG-CCA indicator set and the OECD / DAC core indicators.

(c) **International Conventions and Agreements:** The Declaration of Alma Ata (1978) set a target of life expectancy greater than 60 years by the year 2000; the World Summit for Social Development (WSSD) also included this goal. The ICPD Programme of Action specified that: life expectancy should be greater than 65 years by 2005 and 70 years by 2015 for countries that currently have the highest levels of mortality; and 70 years and 75 years, respectively, for the other countries (ICPD Programme of Action, paragraph 8.5).

(d) **International Targets/Recommended Standards:** See above.

(e) **Linkages to Other Indicators:** This indicator reflects many social, economic, and environmental influences. It is closely related to other demographic variables, and it is related to human health and the environment as well as economic indicators.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Calculation of life expectancy at birth is based on age-specific death rates for a particular calendar period. The death rates are commonly tabulated for ages 0 to1 years, 1 to 5 years, and for 5-year age groups for ages 5 and above.

(b) **Measurement Methods:** Several steps are needed to derive life expectancy from age-specific death rates; the details can be found in demographic or actuarial references that describe construction of life tables, for example, Pressat (1972) or Shryock and Siegel (1980). For a description of the methodology that is linked to computer routines to aid in the calculation, see MORTPAK (section 6, below).

(c) **Limitations of the Indicator:** Where data on deaths by age are of good quality, or adjustments for age misstatement and incompleteness can be made, the life expectancy at birth can be calculated directly from registered deaths and population counts, which are usually based on census enumerations, evaluated and, if necessary, adjusted. When data on deaths by age are unavailable from registration systems or sample surveys, the life expectancy at birth can be calculated through "indirect" methods based on special questions asked in censuses or demographic surveys. For information on these indirect estimates, see Manual X and MORTPAK (section 6, below).

(d) **Status of the Methodology:** Not available.

(e) **Alternative Definitions/ Indicators:** Another indicator of general mortality in common use is the Crude Death Rate (CDR), which is the number of deaths in a period (commonly a one-year period) divided by the mid-period population; it is usually expressed in units of deaths per 1,000 population. The CDR requires less detailed data for its calculation than does life expectancy at birth, but it has the drawback of being influenced to a substantial degree by population age structure: two populations with the same CDR could have markedly different mortality risks, age by age.

Life expectancy may be calculated separately for males and females, or for both sexes combined. If the underlying data permit, life expectancy may also be calculated for subnational regions, or for other population subgroups. Life expectancy can also be presented for particular ages after birth. For instance, life expectancy at age 60 represents the number of additional years an individual who has just reached age 60 can expect to live, given current age-specific mortality rates for older ages.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Some data sources yield estimates of age-specific mortality for only some age groups, so that it may be necessary to employ separate adjustments to data from different sources in order to arrive at a complete and consistent set of rates for a given period of time. Most countries tabulate data from death registration systems at the sub-national level. The under-5 mortality rate and the crude death rate are more readily available for sub-national units than is life expectancy at birth.

(b) **National and International Data Availability and Sources:** Data are collected by the United Nations on a regular basis and are available for most countries from vital registration systems or surveys. For all countries, census and registration data are evaluated and, if necessary, adjusted for incompleteness by the United Nations Department of Economic and Social Affairs (DESA), Population Division, as part of its preparations of the official United Nations population estimates and projections.

(c) **Data References:** Past, current and projected estimates of life expectancy at birth are prepared for all countries by the Population Division, DESA and appear in the United Nations publication, *World Population Prospects: The 1998 Revision* (see section 6, below).

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Department of Economic and Social Affairs (UN / DESA). The contact point is the Director, Population Division, fax no. (1 212) 963 2147.

(b) Other Contributing Organizations: The United Nations Statistics Division / DESA; and the United Nations Children's Fund (UNICEF); and the World Health Organization (WHO).

6. REFERENCES

(a) **Readings:**

DESA, Population Division, *World Population Prospects: The 2004 Revision. Vol. I. Comprehensive Tables* (United Nations publication, ST / ESA / SER.A / 244, New York, forthcoming).

DESA, Population Division, *World Population Prospects: The 2002 Revision. Vol. III. Analytical Report* (United Nations publication E.03.XIII.10, New York, 2004).

DESA, Population Division. *Manual X: Indirect Techniques for Demographic Estimation*. United Nations Sales No. E.83.XIII.2, New York, 1983.

DESA, Population Division, *MORTPAK for Windows - The United Nations Software Package for Demographic Measurement,* CD-ROM (United Nations, New York, 2003).

DESA, Statistics Division, *Demographic Yearbook 2001,* (United Nations Sales No. 03.XIII.1, 2004).

Pressat, R. *Demographic Analysis: Methods, Results, Applications.* London, Edward Arnold; Chicago, Aldine Atherton. 1972.

Shryock, H.S, and J.S.Siegel. *The Methods and Materials of Demography*. U.S. Government Printing Office, Washington, D.C. 1980.

United Nations. *Report of the International Conference on Population and Development.* Programme of Action of the International Conference on Population and Development. United Nations Document A / CONF. 171 / 13. Cairo, Egypt, September 5-13, 1994.

(b) **Internet sites:**

Statistics are available at:

http://www.un.org/esa/population/unpop.htm

PERCENTAGE OF POPULATION WITH ACCESS TO AN IMPROVED SANITATION FACILITY		
Social	**Health**	**Sanitation**

1. INDICATOR

(a) **Name:** Percentage of population with access to an improved sanitation facility, urban and rural.

(b) **Brief Definition:** Proportion of population with access to a private sanitary facility for human excreta disposal in the dwelling or immediate vicinity.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social / Health / Sanitation.

2. POLICY RELEVANCE

(a) **Purpose:** To monitor progress in the accessibility of the population to sanitation facilities.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** This represents a basic indicator useful for assessing sustainable development, especially human health. Accessibility to adequate excreta disposal facilities is fundamental to decrease the faecal risk and the frequency of associated diseases. Its association with other socioeconomic characteristics (education, income) and its contribution to general hygiene and quality of life also make it a good universal indicator of human development. When broken down by geographic (such as rural / urban zones) or social or economic criteria, it also provides tangible evidence of inequities.

(c) **International Conventions and Agreements:** Agenda 21 UNCED (1992) indicates the need for universal coverage and the Second World Water Forum and Ministerial Conference, The Hague, March 2000 established the target of universal coverage by the year 2025, the Millennium Summit, 2000, established the target of halving the proportion of unserved by 2015.

(d) **International Targets/Recommended Standards:** International targets for this indicator have been established according to different international events (see above).

(e) **Linkages to Other Indicators:** The indicator is closely associated with other socioeconomic indicators (see section 2(b) above), particularly the proportion of population with access to improved water sources. The indicator represents two of the eight elements of primary health care and is one of the targets of the Millennium Development Goals.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Definitions for sanitary facility:

i) *Sanitary facility:* "A sanitary facility is a unit for disposal of human excreta which isolates faeces from contact with people, animals, crops and water sources. Suitable facilities range from simple but protected pit latrines to flush toilets with sewerage. All facilities, to be effective, must be private, correctly constructed and properly maintained".

ii) *Population covered:* This includes the urban and rural population served by improved sanitation facilities including connections to public sewers, pit privies, pour-flush latrines, septic tank, ventilated improved latrines, latrines with slabs, etc.)

(b) **Measurement Methods:** This indicator may be calculated as follows: The numerator is the number of people with improved excreta-disposal facilities available multiplied by 100. The denominator is the total population.

(c) **Limitations of the Indicator:** The indicator uses a proxy to adequate sanitation facilities as it is not possible at the current stage to define precisely the proportion of population with sanitary facilities strictly according to the conceptual definitions above.

(d) **Status of the Methodology:** The estimates of access to improved sanitation facilities are obtained from the use of existing sample household surveys such as DHS, MICS and national censuses. Trend lines of urban and rural coverage are build up, which provide estimates for relevant years as required (the last estimates were carried out in 2004 referring to coverage figures for 1990 and 2002).

(e) **Alternative Definitions/Indicators:** An additional indicator dealing with access to toilet facilities flushing to sewerage systems might be relevant. The population that must be used in the numerator is the number of people with access to these facilities.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The number of people with access to improved excreta disposal facilities, and the total population.

(b) **National and International Data Availability and Sources:** Routinely collected at the national and sub-national levels in most countries using censuses and surveys. Household surveys used by the JMP include: USAID supported Demographic and Health Surveys (DHS); UNICEF supported Multiple Indicator Cluster Surveys (MICS); national census reports; WHO supported World Health Surveys; and other reliable country surveys that allow data to be compared.

(c) **Data References:** Not Available.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agencies are the World Health Organization (WHO) and UNICEF through the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP). The contact point is the Coordinator, Water, Sanitation and Health, WHO or the Unit Chief WES at UNICEF.

(b) **Other Contributing Organizations:** Members of the JMP Technical Advisory Group including individual experts from academic institutions and civil society, plus representatives of organizations involved in both water and sanitation and data collection, including UN-Habitat, ORC Macro International, United Nations Environment Programme, the Environmental Health Project of the United States Agency for International Development, the World Bank, the Water Supply and Sanitation Collaborative Council and the Millennium Project.

6. REFERENCES

(a) **Readings:**

WHO, *Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000.* Geneva, WHO, 1981, p. 29.

WHO, *Global Strategy for Health for All by the Year 2000.* Geneva, WHO, 1981.

WHO, *Ninth General Programme of Work Covering the Period 1996-2001.* Geneva, WHO, 1994.

World Health Organization, Division of Operational Support in Environmental Health, October 1995.

World Health Organization. *National and Global Monitoring of Water Supply and Sanitation.* CWS Series of Cooperative Action for the Decade, No. 2, 1982.

World Health Organization. *Water Supply and Sanitation Sector Monitoring Report (WSSSMR)*, 1990.

(b) **Internet site:** World Health Organization. http://www.who.org

POPULATION WITH ACCESS TO SAFE DRINKING WATER		
Social	**Health**	**Drinking Water**

1. INDICATOR

(a) **Name:** Population with Access to Safe Drinking Water.

(b) **Brief Definition:** Proportion of population with access to an improved drinking water source in a dwelling or located within a convenient distance from the user's dwelling.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social / Health / Drinking Water.

2. POLICY RELEVANCE

(a) **Purpose:** To monitor progress in the accessibility of the population to improved water sources.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Accessibility to improved water sources is of fundamental significance to lowering the faecal risk and frequency of associated diseases. Its association with other socioeconomic characteristics, including education and income, which also makes it a good universal indicator of human development. When broken down by geographic (such as rural / urban zones), or social or economic criteria, it provides useful information on equity issues.

(c) **International Conventions and Agreements:** Agenda 21 of UNCED (1992) indicates the need for universal coverage and the Second World Water Forum and Ministerial Conference, The Hague, March 2000 established the target of universal coverage by the year 2025, the Millennium Summit, 2000, established the target of halving the proportion of unserved by 2015.

(d) **International Targets/Recommended Standards:** International targets for this indicator have been established according to different international events (see above)..

(e) **Linkages to Other Indicators:** This indicator is closely associated with other socioeconomic indicators on the proportion of people covered by adequate sanitation. These indicators are among the eight elements of primary health care and are one of the targets of the Millennium Development Goals. It also has close links to other water indicators such as withdrawals, reserves, consumption, or quality. (See section 2(b) above.)

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** This indicator requires definitions for several elements.

i) *Population covered:* This includes urban and rural population served by house connections, or without house connections but with reasonable access to other sources.

ii) *Reasonable access to water:* not more than 1000 metres from a house to a public stand post or any other improved drinking water source providing at least 20 litres per capita per day may be considered reasonable access.

iii) *Minimum amount of water:* The amount of water needed to satisfy metabolic, hygienic, and domestic requirements. This is usually defined as twenty litres of safe water per person per day.

iv) *Safe water:* The water does not contain biological or chemical agents at concentration levels directly detrimental to health according to WHO's guidelines for drinking water quality or national standards of water quality. It is likely that treated surface waters, and water such as that

from protected boreholes, springs, and sanitary wells are safe. Untreated surface waters, such as streams and lakes, should be considered safe only if the water quality is regularly monitored and considered acceptable by public health officials. Water from unimproved sources is likely to be unsafe.

(b) **Measurement Methods:** This indicator may be calculated as follows: The numerator is the number of persons with sustainable access to an improved drinking water source located within a convenient distance from the user's dwelling multiplied by 100. The denominator is the total population.

(c) **Limitations of the Indicator:** The existence of a water outlet within reasonable distance is often used as a proxy for availability of safe water. The existence of a water outlet, however, is no guarantee in itself that water will always be available or safe, or that people always use such sources.

(d) **Status of the Methodology:** The estimates of access to improved drinking water facilities are obtained from the use of existing sample household surveys such as DHS, MICS and national censuses. Trend lines of urban and rural coverage are build up, which provide estimates for relevant years as required (the last estimates were carried out in 2004 referring to coverage figures for 1990 and 2002).

(e) **Alternative Definitions/Indicators:** An additional indicator expressed as the percent of population with access to household connections from a public piped distribution system would be very relevant.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The number of people with access to improved water sources, and the total population. Data on the source of water, for example, house tap or yard pipe, would provide additional meaning to this indicator.

(b) **National and International Data Availability and Sources:** Routinely collected at the national and sub-national levels in most countries using censuses and surveys. Household surveys used by the JMP include: USAID supported Demographic and Health Surveys (DHS); UNICEF supported Multiple Indicator Cluster Surveys (MICS); national census reports; WHO supported World Health Surveys; and other reliable country surveys that allow data to be compared. (c) **Data References:** Not Available.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agencies are the World Health Organization (WHO) and UNICEF through the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP). The contact point is the Coordinator, Water, Sanitation and Health, WHO or the Unit Chief WES at UNICEF
(b) **Other Contributing Organizations:** Members of the JMP Technical Advisory Group including individual experts from academic institutions and civil society, plus representatives of organizations involved in both water and sanitation and data collection, including UN-Habitat, ORC Macro International, United Nations Environment Programme, the Environmental Health Project of the United States Agency for International Development, the World Bank, the Water Supply and Sanitation Collaborative Council and the Millennium Project.

6. REFERENCES

(a) **Readings:**

WHO, *Global Strategy for Health for All by the Year 2000.* Geneva, WHO, 1981.

WHO, *Ninth General Programme of Work Covering the Period 1996-2001.* Geneva, WHO, 1994.

WHO, *Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000.* Geneva, WHO, 1981, p. 40.

World Health Organization. *National and Global Monitoring of Water Supply and Sanitation.* CWS Series of Cooperative Action for the Decade, No. 2, 1982.

World Health Organization. *Water Supply and Sanitation Sector Monitoring Report (WSSSMR),* 1990.

Program of Action of the Ministerial Drinking Water Conference, 1994.

(b) **Internet site:** World Health Organization. http://www.who.org

PERCENT OF POPULATION WITH ACCESS TO PRIMARY HEALTH CARE FACILITIES		
Social	**Health**	**Healthcare Delivery**

1. INDICATOR

(a) **Name:** Percentage of Population with Access to Primary Health Care Facilities.

(b) **Brief Definition:** Proportion of population with access to primary health care facilities.

(c) **Unit of Measurement: %.**

(c) **Placement in the CSD Indicator Set:** Social / Health / Healthcare Delivery.

2. POLICY RELEVANCE

(a) **Purpose:** To monitor progress in the access of the population to primary health care.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Accessibility of health services, going beyond just physical access, and including economic, social and cultural accessibility and acceptability, is of fundamental significance to reflect on health system progress, equity and sustainable development. It should, however, be supplemented by indicators of utilization of services, or actual coverage, and quality of care. In addition, accessibility is an instrumental goal, a means to an end, to achieving the final intrinsic goals of the system. The more accessible a system is, the more people should utilize it to improve their health.

(c) **International Conventions and Agreements:** World Health Assembly Resolution WHA34.36, Global Strategy for Health for All by the Year 2000.

(d) **International Targets/Recommended Standards:** International targets have been outlined in the Global Strategy for Health for All and more recently in the Ninth General Programme of Work. In addition, many countries have established national targets.

(e) **Linkage to Other Indicators:** This indicator is associated with other socioeconomic indicators on the proportion of people covered by other essential elements of primary health care. It should also, as indicated above, be linked with indicators of utilization of services and quality of care.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:**

(i) Primary health care: is essential health care made accessible at a cost the country and community can afford, with methods that are practical, scientifically sound and socially acceptable.

(ii) Population covered: All the population living in the service area of the health facility.

(iii) Access: Definition of accessibility may vary between countries, for different parts of the country and for different types of services.

(b) **Measurement Methods:** The numerator - the number of persons living within a convenient distance to primary care facilities; the denominator - the total population.

(c) **Limitations of the Indicator:** The existence of a facility within reasonable distance is often used as a proxy for availability of health care. If the existing primary care facility, however, is not properly functioning, provides care of inadequate quality, is economically not affordable, and socially or culturally not acceptable, physical access has very little value as this facility is bypassed and not utilized. Therefore, other factors, as mentioned in 3(e) have to be taken into account.

(d) **Status of the Methodology:** Not Available.

(e) **Alternative Definitions/Indicators:** In the light of 3(c) the indicator must be supplemented by indicators of availability of services, quality of services, acceptability of services, affordability of services, or utilization of services.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The number of people with access to primary health care facilities, total population in service areas of health facilities.

(b) **National and International Data Availability and Sources:** No routinely available data. Information has to be acquired through surveys. Data Sources include Ministries of Health and National Statistical Offices.

(c) **Data References:** Not Available.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Health Organization (WHO). The contact point is the Director, Health System Policies and Operations, fax: 41 22 791 4747.

(b) **Other Contributing Organizations:** None.

6. REFERENCES

(a) **Readings:**

HIS Development Strategy and Catalogue of Health Indicators, Geneva 2000 (EIP / OSD / 00.12)

WHO, *The World Health Report 2000; Health Systems: Improving Performance*, Geneva, 2000.

El-Bindari-Hammad, Smith, DL, *Primary Health Care Reviews, Guidelines and Methods*, WHO, Geneva, 1992.

WHO, *Development of Indicators for Monitoring Progress towards Health for All by the Year 2000*, Geneva, 1981.

WHO, *Evaluating the Implementation of the Strategy for Health for All by the Year 2000, Common Framework: Third Evaluation*, Geneva, 1996.

WHO, *Health Centres: the 80/20 Imbalance; Burden of Work Vs Resources*, Geneva, 1999.

(b) **Internet site:** World Health Organization. http://www.who.org

CONTRACEPTIVE PREVALENCE RATE		
Social	**Health**	**Healthcare Delivery**

1. INDICATOR

(a) **Name:** Contraceptive Prevalence Rate (CPR).

(b) **Brief Definition:** This indicator is generally defined as the percent of women of reproductive age (15-49 yrs) using any method of contraception at a given point in time. It is usually calculated for married women of reproductive age, but sometimes for other base population, such as all women of reproductive age at risk of pregnancy.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Social / Health / Healthcare Delivery.

2. POLICY RELEVANCE

(a) **Purpose:** The measure indicates the extent of people's conscious efforts and capabilities to control their fertility. It does not capture all actions taken to control fertility, since induced abortion is common in many countries.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Increased contraceptive prevalence, is, in general, the single most important proximate determinant of inter-country differences in fertility, and of ongoing fertility declines in developing countries. Contraceptive prevalence is also an indicator of access to reproductive health services one of the eight elements of primary health care (Ref: WHO / RHR / 04.011). Agenda 21 discusses reproductive health programmes, which include family planning, as among the programmes that promote changes in demographic trends, factors towards sustainability and development..

Health benefits include the ability to prevent pregnancies that are too early, too closely spaced, too late, or too many. By preventing unintended pregnancies, contraception reduces resort to induced abortion - as well as avoiding potential complications of pregnancy including maternal morbidities and mortality. Current contraceptive practice depends not only on people's fertility desires, but also on availability, functioning, and quality of family planning services; social influences that affect contraceptive use; and other factors, such as marriage patterns and traditional birth-spacing practices, that independently influence the (supply of children?).

(c) **International Conventions and Agreements:** Family planning is included and discussed in the broader context of reproductive, sexual health, and reproductive rights by Chapter VII of the Programme of Action, International Conference on Population and Development (ICPD); and Strategic Objective C of the Platform for Action adopted at the Fourth World Conference on Women.

(d) **International Targets/Recommended Standards:** International agreements do not establish specific national or global targets for contraceptive prevalence. Recent international conferences have

strongly affirmed the right of couples and individuals to choose the number, spacing and timing of their children, and to have access to the information and means to do so. The ICPD Programme of Action states that "Governmental goals for family planning should be defined in terms of unmet needs for information and services. Demographic goals, while legitimately the subject of government development strategies, should not be imposed on family-planning providers in the form of targets or quotas for the recruitment of clients" (paragraph 7.12).

(e) **Linkages to Other Indicators:** The level of contraceptive use has a strong, direct effect on the total fertility rate (TFR) and, through the TFR, on the rate of population growth. Use of contraception to prevent pregnancies that are too early, too closely spaced, too late, or too many has benefits for maternal and child health. This indicator is also closely linked to access to primary health care services particularly those pertaining to reproductive health care. Furthermore, it has broader and predictive implications for many other sustainable development indicators and issues, such as rate of change of school-age population, woman's participation in the labour force, and natural resource use.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The standard indicator is the percentage currently using or whose partner is using any method of contraception among married (or in a stable union) women aged 15-49 or 15-44. In this context, the married group usually includes those in consensual or common-law unions in societies where such unions are common. Contraceptive prevalence is also frequently reported for all women of reproductive age at risk of pregnancy, and statistics are sometimes presented for men instead of, or in addition to, women (see attached document).

Users of contraception are defined as women who are practising, or whose male partners are practising, any form of contraception. These include female and male sterilization, hormonal methods (injectable and oral contraceptives, implants), intrauterine devices, diaphragms, spermicide, condoms, rhythm, withdrawal and abstinence, lactation amenorrhoea, among others.

For this indicator, *too early* is defined as under age 15. Such adolescents are 5 to 7 times more likely to die in pregnancy and childbirth than women in the lowest risk group of 20-24 years. *Too closely spaced* means women who become pregnant less than two years after a previous birth. Greater adverse consequences to women and their children are experienced under such circumstances. Women who have had five or more pregnancies (*too many*) or who are over 35 *(too late*), also face a substantially higher risk than the 20-24 year old group.

When presenting information about contraceptive use, it is useful to show the data according to specific type of contraception; by social characteristics such as rural/urban or region of residence, education, marital status; by 5-year age group, including specific attention to adolescents aged under 18 years; and by family size.

(b) **Measurement Methods:** Measurements of contraceptive prevalence come almost entirely from representative sample surveys of women or men of reproductive age. Current use of contraception is usually assessed through a series of questions about knowledge and use of particular methods.

(c) **Limitations of the Indicator:** For surveys, under-reporting can occur when specific methods are not mentioned by the interviewer. This can be the case with the use of traditional methods such as

rhythm and withdrawal, and use of contraceptive surgical sterilization. The list of specific methods is not completely uniform in practice, but in most cases is sufficiently consistent to permit meaningful comparison. "Current" use is often specified in surveys to mean "within the last month", but sometimes the time reference is left vague, and occasionally longer reference periods are specified. With statistics from family planning programmes, the accuracy of the assumptions is often difficult to assess. The derived estimates obviously omit contraceptive users who do not use the programme's services, and thus tend to underestimate the overall level of use.

Service statistics maintained by family planning programmes are also sometimes used to derive estimates of contraceptive prevalence. In such cases it is necessary to apply assumptions in order to derive estimates of numbers of current users from the records of numbers of family planning clients. Base population statistics (numbers of women or of married women) are in this case usually derived from census counts, adjusted to the reference date by the Population Division of the Department of Economic and Social Affairs (DESA), as part of its preparations of the official United Nations population estimates and projections.

(d) **Status of the Methodology:** The methodology is widely used in both developed and developing countries.

(e) **Alternative Definitions/Indicators:** None.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Number of women of reproductive age at risk of pregnancy using family planning methods. Number of women of reproductive age at risk of pregnancy. Both data sets are frequently limited to married women, and those in stable union.

(b) **National and International Data Availability and Sources:** The most recent United Nations review of contraceptive prevalence includes statistics for 119 countries and areas with information dating from 1975 or later. These countries include 90 per cent of world population. This review includes contraceptive prevalence measures for all women of reproductive age in 64 countries and areas and for samples of men in 27 countries and areas.

Contraceptive prevalence is one of the few topics for which data coverage is more complete and more current for developing than for developed countries. Most surveys provide estimates for major regions within countries as well as at the national level. Less frequently the sample design permits examining prevalence at the state, provincial, or lower administrative levels. In addition to those with national or near-national coverage, surveys covering this topic are sometimes available for particular geographic areas. Data are much less widely available for population groups other than married women, although such information has increased in recent years.

(c) **Data References:** Executing agencies for surveys covering this topic vary. National statistical offices and ministries of health are the most common source, but other governmental offices, non-governmental voluntary or commercial organizations are frequently involved. Many surveys are conducted in collaboration with international survey programmes. The Population Division, DESA regularly compiles information about contraceptive prevalence and publishes it in the annual *World Population Monitoring* report.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Health Organization (WHO). The contact point is the Director, Reproductive Health and Research, fax no. (41 22) 791 3111.

(b) **Other Contributing Organizations:** The United Nations Department of Economic and Social Affairs (DESA), with the contact point as the Director, Population Division, fax no. (1 212) 963 2147.

6. REFERENCES

(a) **Readings:**

Levels and Trends of Contraceptive Use as Assessed in 1988 (United Nations, Sales No. E.89.XIII.4).

Levels and Trends of Contraceptive Use as Assessed in 1994 (United Nations, ST/ESA/SER.A/146, forthcoming).

Programme of Action of the International Conference on Population and Development, *Report of the International Conference on Population and Development*, Cairo, Egypt, September 5-13, 1994. (United Nations Document - A/CONF. 171/13).

World Population Monitoring, 1993 (Sales No. E.95.XIII.8, New York).

World Population Monitoring, 1996 (ESA/P/WP.131).

(b) **Internet site:** World Health Organization. http://www.who.org

POPULATION GROWTH RATE		
Social	**Population**	**Population change**

1. INDICATOR

(a) **Name:** Population Growth Rate.

(b) **Brief Definition:** The average annual rate of change of population size during a specified period.

(c) **Unit of Measurement:** Usually expressed as a percentage.

(d) **Placement in the CSD Indicator Set:** Social / Population / Population change.

2. POLICY RELEVANCE

(a) **Purpose:** The population growth rate measures how fast the size of the population is changing.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Agenda 21 identifies population growth as one of the crucial elements affecting long-term sustainability (see especially paragraphs 5.3 and 5.16). Population growth, at both national and subnational levels, represents a fundamental indicator for national decision-makers. Its significance must be analyzed in relation to other factors affecting sustainability. However, rapid population growth can place strain on a country's capacity for handling a wide range of issues of economic, social, and environmental significance, particularly when rapid population growth occurs in conjunction with poverty and lack of access to resources, or unsustainable patterns of production and consumption, or in ecologically vulnerable zones (see paragraphs 3.14, 3.25 and 3.26 of the ICPD Programme of Action).

(c) **International Conventions and Agreements:** None.

(d) **International Targets/Recommended Standards:** International agreements do not establish national or global targets. A number of national governments have adopted numerical targets for the rate of population growth. However, in 2003, 19 percent of governments considered their rates of population growth to be too low, 40 percent were satisfied with the rate, and 41 percent considered it to be too high.

(e) **Linkages to Other Indicators:** There are close linkages between this indicator and other demographic and social indicators, as well as all indicators expressed in per capita terms (for example, GDP per capita). Population growth usually has implications for indicators related to education, infrastructure, and employment. It is also related to human settlements and the use of natural resources, including sink capacities. Population growth can increase environmental degradation, although this is not always the case.

3. METHODOLOGICAL DESCRIPTION

The rate of population growth, *r*, between two times, t_1 and t_2, is calculated as an exponential rate of growth, conventionally expressed in units of per cent per year:

$$r = 100 \ln (P_2/P_1)/(t_2 - t_1)$$

Where P_1 and P_2 are the number of persons at times 1 and 2, respectively, and the time interval $(t_2 - t_1)$ is expressed in years.

For a country, the estimate is generally based on either (i) an intercensal population growth rate calculated from two censuses, each adjusted for incompleteness; or (ii) from the components of population growth (adjusted for incompleteness, when necessary) during a period; the components are numbers of births, deaths and migrants. Intercensal growth rates can also be calculated for subnational areas.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** As indicated above, the population growth rate can be calculated either from census data or from registration data (births, deaths and migrants). The United Nations recommends that countries take censuses every 10 years, and these data can be used to calculate an intercensal population growth rate.

(b) **National and International Data Availability and Sources:** In recent decades, most countries have carried out population censuses. Data on births, deaths and migrants may come from national registration systems or from special questions in demographic surveys and censuses. National and sub-national census data, as well as data on births, deaths and migrants, are available for the large majority of countries from national sources and publications; as well as from questionnaires sent to national statistical offices from the UN Department of Economic and Social Affairs (DESA), Statistics Division. For all countries, census and registration data are evaluated and, if necessary, adjusted for incompleteness by DESA's Population Division as part of its preparations of the official United Nations population estimates and projections.

(c) **Data References:** Past, current and projected population growth rates are prepared for all countries by the Population Division, DESA, and appear in the United Nations publication, *World Population Prospects: The 2004 Revision*.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Department of Economic and Social Affairs (DESA). The contact point is the Director, Population Division, DESA; fax no. (1 212) 963 2147.

(b) **Other Contributing Organizations:** None.

6. REFERENCES

(a) **Readings:**

DESA, Population Division, *World Population Prospects: The 2004 Revision. Vol. I. Comprehensive Tables* (United Nations publication, ST/ESA/SER.A/244, New York, forthcoming).

DESA, Population Division, *World Population Prospects: The 2002 Revision. Vol. III. Analytical Report* (United Nations publication E.03.XIII.10, New York, 2004).

DESA, Population Division, *Manual X: Indirect Techniques for Demographic Estimation* (United Nations Sales No. E.83.XIII.2, New York, 1983).

DESA, Population Division, *World Urbanization Prospects: The 2003 Revision* (United Nations publication, E.04.XIII.6, New York, 2004).

DESA, Population Division, *MORTPAK for Windows - The United Nations Software Package for Demographic Measurement,* CD-ROM (United Nations, New York, 2003).

DESA, Statistics Division, *Demographic Yearbook 2001,* (United Nations Sales No. 03.XIII.1, 2004).

For information about government policies regarding this indicator, see:

DESA, Population Division, *World Population Policies2003* (United Nations publication, Sales No. E.04.XIII.3., New York, 2004).

(b) **Internet site:** http://www.un.org/esa/population/unpop.htm

Annex 2: Revised Methodology Sheets for Indicators on Environmental Issues

AMBIENT CONCENTRATION OF AIR POLLUTANTS IN URBAN AREAS		
Environmental	**Atmosphere**	**Air Quality**

1. INDICATOR

(a) **Name:** Ambient concentration of air pollutants in urban areas.

(b) **Brief Definition:** Ambient air pollution concentrations of ozone, particulate matter ($PM_{10,}$ and $PM_{2,5}$, if those are not available: SPM, black smoke), sulphur dioxide, nitrogen dioxide, lead. Additional: carbon monoxide, nitrogen monoxide, volatile organic compounds including benzene (VOCs).

(c) **Unit of Measurement:** $\mu g / m^3$, ppm or ppb, as appropriate; or percentage of days when standards / guideline values are exceeded.

(d) **Placement in the CSD Indicator Set:** Environmental / Atmosphere / Air Quality.

2. POLICY RELEVANCE

(a) **Purpose:** The indicator provides a measure of the state of the environment in terms of air quality and is an indirect measure of population exposure to air pollution of health concern in urban areas.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** An increasing percentage of the world's population lives in urban areas. High population density and the concentration of industry exert great pressures on local environments. Air pollution, from households, industry power stations and transportation (motor vehicles), is often a major problem. As a result, the greatest potential for human exposure to ambient air pollution and subsequent health problems occurs in urban areas. Improving air quality is a significant aspect of promoting sustainable human settlements.

The indicator may be used to monitor trends in air pollution as a basis for prioritising policy actions; to map levels of air pollution in order to identify hotspots or areas in need of special attention; to help assess the number of people exposed to excess levels of air pollution; to monitor levels of compliance with air quality standards; to assess the effects of air quality policies; and to help investigate associations between air pollution and health effects.

(c) **International Conventions and Agreements:** None.

(d) **International Targets/Recommended Standards:** World Health Organization (WHO) air quality guidelines exist for all the pollutants of this indicator, except nitrogen

monoxide. Many countries have established their own air quality standards for many of these pollutants.

(e) **Linkages to Other Indicators:** This indicator is closely linked to others which relate to causes, effects, and societal responses. These include, for example, the indicators on population growth rate, rate of growth of urban population, percent of population in urban areas, annual energy consumption per capita, emissions of sulphur oxides and nitrogen oxides, life expectancy at birth, total national health care as a percent of Gross National Product, share of consumption of renewable energy resources, environmental protection expenditures as a percent of Gross Domestic Product, expenditure on air pollution abatement, childhood morbidity due to acute respiratory illness, childhood mortality due to acute respiratory illness, capability for air quality management, and availability of lead-free gasoline.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The indicator may be designed and constructed in a number of ways. Where monitored data are available, it is usefully expressed in terms of mean annual or percentile concentrations of air pollutants with known health effects – e.g., ozone, carbon monoxide, particulate matter ($PM_{10,}$ $PM_{2,5}$, SPM), black smoke, sulphur dioxide, nitrogen dioxide, volatile organic compounds including benzene (VOCs) and lead – in the outdoor air in urban areas.

Where monitoring data are unavailable, estimates of pollution levels may be made using air pollution models. Dispersion models, however, depend on the availability of emission data; where these are not available, surveys may be conducted using rapid source inventory techniques. Because of the potential errors in the models or in the input data, results from dispersion models should ideally be validated against monitored data.

(b) **Measurement Methods:** Suitable air monitors must fulfil several requirements, such as detection limits, interferences, time resolution, easy operation and of course, cost. There are several good references in the literature or available at agencies on air monitoring and analysis from where information can be obtained. It is important, however, to refer to the published scientific literature for the most appropriate and recent air monitoring methods.

A number of models are available for estimation of ambient concentration of air pollutants. Most of them are founded on the Gaussian air dispersion model.

(c) **Limitations of the Indicator:** Measurement limitations relate to detection limits, interferences, time resolution, easy operation, and cost. Evaluation of the accuracy of model results is critical before relying on model output for decision-making.

(d) **Status of the Methodology:** The methodology is widely used in many developed and developing countries.

(e) **Alternative Definitions:** None.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Data must be time and spatially representative concentrations such as, for example, mean annual concentrations (mean concentrations of the pollutant of concern, averaged over all hours of the year) or percentile concentration (concentration of the pollutant of concern exceeded in 100-X% of hours, where X is the percentile as defined by the relevant standards). In addition, information must be available on site location and type (e.g., industrial, transport oriented or residential area).

(b) **National and International Data Availability and Sources:** Data on ambient air pollution concentrations is often routinely collected by national or local monitoring networks. Data is often also collected for research purposes by universities and research institutes. In addition, industry collects many data.

(c) **Data References:** Data on ambient air pollution can be obtained from national and local monitoring networks. Sometimes, data is available from universities, research institutes and industry. In addition, a growing volume of data can be obtained from international sources such as the European Environmental Agency.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Health Organization (WHO). The contact point is the Director, Department for the Protection of the Human Environment; fax no. (41 22) 791 4159.

(b) **Other Contributing Organizations:** The United Nations Environment Programme.

6. REFERENCES

(a) **Readings:**

WHO (2000) *Air Quality Guidelines for Europe, Second Edition. WHO Regional Publications, European Series, No. 91*

WHO (2000) *Human Exposure Assessment*, Environmental Health Criteria Document 214, Programme of Chemical Safety.

WHO (2000) *Decision-Making in Environmental Health: From Evidence to Action*, edited by C. Corvalan, D. Briggs and G. Zielhuis, E & FN Spon, London, New York.

WHO (1999) *Monitoring Ambient Air Quality for Health Impact Assessment*, WHO Regional Publications, European Series, No. 85.

WHO (1999) *Environmental Health Indicators: Framework and Methodologies.* Prepared by D. Briggs, Occupational and Environmental Health.

Schwela & Zali (eds. 1999) *Urban Traffic Pollution*. Edited by D. Schwela and O. Zali, E & FN Spon, London, New York.

UNEP / WHO (1992) *Urban Air Pollution in Megacities of the World*, Blackwell Publishers, Oxford, UK.

UNEP / WHO (1994) *Global Environmental Monitoring System (GEMS/Air)*, Methodology Review Handbook Series. Volumes 2, 3, and 4.

(b) **Internet sites:**

http://www.who.org

http://www.unep.org

PRESENCE OF FAECAL COLIFORMS IN FRESHWATER		
Environmental	**Fresh Water**	**Water Quality**

1. INDICATOR

(a) **Name:** Presence of Faecal Coliforms in Freshwater.

(b) **Brief Definition:** The proportion of freshwater resources destined for potable supply containing concentrations of faecal coliforms which exceed the levels recommended in the World Health Organization (WHO) Guidelines for Drinking-water Quality.

(c) **Unit of Measurement:** %

(d) **Placement in the CSD Indicator Set:** Environmental / Fresh Water / Water Quality.

2. POLICY RELEVANCE

(a) **Purpose:** The indicator assesses the microbial quality of water available to communities for basic needs. It identifies communities where contamination of water with human and animal excreta at source or in the supply poses a threat to health.

(b) **Relevance to Sustainable/Unsuitable Development (theme/sub-theme):** The concentration of faecal coliforms in freshwater bodies is an indirect indicator of contamination with human and animal excreta. Water contaminated with human and animal excreta poses a serious health risk and is therefore unsuitable for potable supply unless it has been suitably treated. Faecal indicator bacteria remain the preferred way of assessing the hygienic quality of water. *Escherichia coli (E. coli*), the thermotolerant and other coliform bacteria, the faecal streptococci and spores of sulphite-reducing clostridia, are common indicators of this type used. This measure indicates situations where treatment is required or has to be improved to guarantee safety of supply. As population density increases and / or more people are provided from a supply, the more critical the supply of safe, potable water becomes.

Diarrhoeal diseases, largely the consequence of faecal contamination of drinking-water supply, are variously estimated to be responsible for 80% of morbidity / mortality, or more, in developing countries. A prerequisite for development is a healthy community. Ill health not only reduces the work capability of community members but frequent diarrhoeal episodes disrupt children's development and education, which, in the longer term, can have serious consequences for sustainable development.

(c) **International Conventions and Agreements:** The United Nations Water Conference recommended that governments reaffirm the commitment made at 'Habitat' to adopt programmes with realistic standards for water-quality to provide sanitation for urban and rural areas. The goal of universal coverage was reiterated at the World Summit for Children, in 1990.

(d) **International Targets/Recommended Standards:** The standards are available in the WHO Guidelines for Drinking-water Quality. These have been adopted by most countries.

(e) **Linkages to Other Indicators:** The indicator is closely linked with several others in the environmental and socio-economic (health) categories, including annual water withdrawals, domestic consumption of water *per capita*, biochemical oxygen demand in water bodies, wastewater treatment coverage, and percent of population with adequate excreta disposal facilities.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Ideal faecal indicator characteristics are difficult to find in any one organism. However, many useful characteristics are found in *E. coli* and, to a lesser extent, in the thermotolerant coliform bacteria. For this reason, *E. coli* is the preferred / recommended faecal contamination indicator. Faecal streptococci satisfy some of the criteria and tend to be used as supplementary indicators of faecal pollution indicating both human and animal faeces.

(b) **Measurement Methods:** For the purposes of this indicator, the term "faecal coliforms" encompasses *Escherichia coli* and thermotolerant coliforms.

Microbiological examination provides the most sensitive, although not the most rapid, indication of pollution by faecal matter. Because the growth medium and the conditions of incubation, as well as the nature and age of the water sample, can influence microbiological analysis, accuracy of results may be variable. This means that the standardization of methods and laboratory procedures are extremely important. Established standard methods are available through the International Organization of Standardization (ISO), American Public Health Association (APHA), the UK Department of Health (DHSS), and the Guidelines for Drinking-water Quality (WHO).

Determination of sample size is the first important step in the examination. The source of the sample will determine, in the first instance, the concentration of organisms. Under normal conditions, the volume of sample for a lake or reservoir sample would be 100 ml, while in the case of raw municipal sewage, only 0.001 ml would be required. Larger samples would result in too large a number of organisms to make counting possible. Time-of-travel may often be of relevance, and changes in the bacterial characteristics of samples can be reduced to a minimum by ensuring the samples are not exposed to light and are kept between 4 and 10°C for the shortest feasible time – preferably analysed within six hours. Such precautions are particularly important in tropical climates where ambient temperatures are high and sunlight (ultra-violet radiation) is brightest.

(c) **Limitations of the Indicator:** Concentration of *E. coli* or thermotolerant or faecal coliforms in a water sample provides only one part of the picture with regard to water-quality. To assess the overall status of water at source and supplied for potable and other uses, it is necessary to combine the information of this indicator with complementary data on physical and chemical water quality. *E. coli* is predominantly an indicator but, under certain circumstances, can itself be a pathogen.

(d) **Status of the Methodology:** Not Available.

(e) **Alternative Definitions/Indicators:** The indicator could be shown as the proportion of the population using water source for domestic water supply that does not meet the standards. The microbiological quality of water in relation to faecal contamination can be currently defined in terms of *E. coli*, thermotolerant coliform bacteria, total coliform organisms, faecal streptococci, sulphite-reducing clostridia, bifidobacteria and coliphages. The magnitude of deviation from the WHO guideline value for microbial water quality, expressed as the average concentration in a water resource, could also indicate the degree or magnitude of contamination of a water supply.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Records of water authorities laboratories, hydro-geological institutes, universities, municipal public health laboratories, research institutes, and special studies, which show the level of *E. coli*, or thermotolerant coliform bacteria.

(b) **National and International Data Availability and Sources:** Data are normally available from municipal water supply authorities on a routine basis. Ministries of Health in many countries often check on the bacterial quality of new sources when they are being considered for supply purposes.

The data are available from national water authorities and water supply utilities, Ministries of Health, and research institutes.

(c) **Data References:** Not Available.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Health Organization (WHO). The contact point is the Coordinator, Water, Sanitation and Health, Department of Protection of Human Health, WHO; fax no. (41 22) 791 4159.

(b) **Other Contributing Organizations:** Other organizations contributing to the development of this indicator include: the Water and Environmental Sanitation Section, United Nations Children's Fund (UNICEF); United Nations Centre for Human Settlements (HABITAT); Land and Water Division, Food and Agriculture Organization of the United Nations (FAO); and the United Nations Environment Programme Global Environment Monitoring System for Freshwater (UNEP GEMS/Water)**.**

6. REFERENCES

(a) **Readings:**

WHO. *Guidelines for Drinking-Water Quality*. Second Edition, Volume 1 Recommendations, WHO, Geneva, 1993, and Volume 3: Surveillance and Control of Comments Supplies, WHO, Geneva, 1996.

American Public Health Association, American Water Works Association, and Water Pollution Control Federation. *Standard Methods for the Examination of Water and Wastewater*. 17th Edition, 1989.

International Organization for Standardization. *Water Quality: Detection and Enumeration of the Spores of Sulphite-reducing Anaerobes (clostridia*). Part 1: Method by Enrichment in a Liquid Medium. ISO 646171.

International Organization for Standardization. *Water Quality: Enumeration of Viable Microorganisms—Colony Count by Inoculation in or on a Nutrient Agar Culture Medium.* ISO 6222.

International Organization for Standardization. Water Quality: Detection and Enumeration of Coliform Organisms, Thermotolerant Coliform Organisms and Presumptive Escherichia coli, ISO 9308-2; Part 1 Membrane Filtration Method, Part 2 Multiple Tube. ISO 9308-1.

International Organization for Standardization. *Water Quality: Detection and Enumeration of Faecal Streptococci*; Part 1 Method by Enrichment in a Liquid Medium, Part 2 Method by Membrane Filtration. ISO 7899/2.

(b) **Internet site:** World Health Organization. http://www.who.org

PROTECTED AREA AS A PERCENT OF TOTAL AREA		
Environmental	**Biodiversity**	**Ecosystems**

1. INDICATOR

(a) **Name:** Protected Area as a Percent of Total Area.

(b) Brief Definition: This indicator measures the area of protected land ecosystems, inland water ecosystems, and marine ecosystems expressed as a percentage of the total area of land ecosystems, inland water ecosystems and marine ecosystems respectively.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set:** Environmental / Biodiversity / Ecosystems.

2. POLICY RELEVANCE

(a) **Purpose:** The indicator represents the extent to which areas important for conserving biodiversity, cultural heritage, scientific research (including baseline monitoring), recreation, natural resource maintenance, and other values, are protected from incompatible uses. It shows how much of each major ecosystem is dedicated to maintaining its diversity and integrity. In general it provides a broad assessment and requires further elaboration particularly in relation to management effectiveness.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Sustainable development depends on a sound environment, which in turn depends on ecosystem diversity. Protected areas, especially the full range of IUCN Protected Area Categories, are essential for conserving biodiversity and also for contributing to sustainable development.

(c) **International Conventions and Agreements:** This indicator shows implementation of Article 8(a) of the Convention on Biological Diversity.

(d) **International Targets/Recommended Standards:** Recommendation 16 of the Fourth World Congress on National Parks and Protected Areas (Caracas, 1992) establishes a target of 10% protected area of each biome (major ecosystem type) by the year 2000 (McNeely 1993). Recommendation 5.04 of the Fifth World Parks Congress (Durban 2003) on Building Comprehensive and Effective Protected Area Systems urges governments, non-government organizations and local communities to maximise representation and persistence of biodiversity in comprehensive protected area networks in all ecoregions by 2012. Recommendation 5.22 of the Fifth World Parks Congress (Durban 2003) on Building a Global System of Marine and Coastal Protected Area Networks calls on the international community to establish by 2012 a global system of effectively managed, representative networks of marine and coastal protected areas

(e) **Linkages to Other Indicators:** This indicator is linked to other indicators which have implications for land and resource use. These would include; Forest Area as a % of Land Area, Wood Harvesting Intensity, Area of Selected Key Ecosystems, Ratification of Global Agreements, etc.

This indicator is most meaningful when accompanied by indicators of the management effectiveness of protected areas as well as the status of ecosystem diversity, particularly of ecosystem modification and conversion. Thus, the indicator of ecosystem protection would show how much of each major ecosystem is protected; and the indicator of ecosystem modification and conversion would show how much of each major ecosystem has been lost or excessively fragmented. This indicator is also linked to indicators of species diversity and environmental quality.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The World Conservation Union defines six management categories of protected area in two groups. *Totally protected areas* are maintained in a natural state and are closed to extractive uses. They comprise Category I, Strict Nature Reserve / Wilderness Area; Category II, National Park; and Category III, National Monument. *Partially protected areas* are managed for specific uses (e.g., recreation) or to provide optimum conditions for certain species or communities. They comprise Category IV, Habitat / Species Management Area; Category V, Protected Landscape / Seascape; and Category VI, Managed Resource Protected Area (IUCN 1994). IUCN recommends that each country develop a system of protected areas which ideally comprises a range of the different categories of protected areas mentioned above. These range from strictly protected areas (Category I and II) to those protected areas which are planned and implemented for both biodiversity conservation and sustainable use. Where possible protected areas have to be selected on the basis of the best science available and also linked with surrounding landuses.

It is desirable to distinguish:

(i) the percentages of the ecosystem area covered by different categories of protected areas

(ii) protected areas in different size classes (e.g., < 1 000 ha, ≥ 1 000 ha, ≥ 10 000 ha, ≥ 100 000 ha, ≥ 1 000 000 ha [larger size classes are possible only in large countries]);

For the purpose of this indicator, ecosystems are usually defined as ecoregional units. The minimum size of the units varies depending on the classification system and the size of the country (or other territory) being assessed.

(b) **Limitations of the Indicator:** The indicator represents *de jure* not *de facto* protection. It does not indicate the quality of management or whether the areas are in fact protected from incompatible uses. It also gives a rather coarse picture of ecosystem protection. Additional detail would be needed to show the effectiveness of management of protected areas, based on systems such as the IUCN PA Management effectiveness Framework. It is also useful to identify the extent of disturbance of the ecosystem within each protected area, and coverage of rare or key ecological communities and habitats.

(d) **Status of the Methodology:** The methodology is increasingly used for land ecosystems, less so for marine ecosystems, and least for inland water ecosystems. Inland waters are usually lumped with the land in a terrestrial classification.

The methodology for this indicator has not been standardized.

(e) **Alternative Definitions/Indicators:** If a suitable ecosystem classification is not available, alternative indicators are terrestrial protected area (land and inland water) as a percentage of the total terrestrial area, and marine protected area as a percentage of the total marine area.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** A map of the ecosystems (ecoregions or equivalent) of the country or territory, preferably using a classification that is internationally compatible and valid for other countries and territories in the region. A map of the protected areas of the country or territory. A geo-referenced list of the protected areas, giving their sizes (area in hectares) and locations, and classifying them by protection category comparable to The World Conservation Union's six management categories of protected area, see 3(a).

(b) **National and International Data Availability and Sources:** Major ecosystem classifications have been mapped for most regions and many countries. However, national classifications may not be compatible with other countries in their region, and few regional classifications are sufficiently detailed or accepted for nation use. Global classifications are generally too coarse. Most countries keep statistics on protected areas, but their protected area systems may not be accurately mapped.

In cooperation with the United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC), IUCN's World Commission on Protected Areas compiles the *United Nations List of Protected Areas*, which provides the name, IUCN category, location, size, and year of establishment of all protected areas which meet the IUCN definition regardless of size and whether or not they have been assigned an IUCN category for all countries. UNEP-WCMC maintains a copy of the UN list, compiles data on smaller protected areas, and has mapped most large areas and many smaller ones. **This is further compiled within the World Database on Protected Areas.**

(c) **Data references:** United Nations List of Protected Areas (2003). Other data, including a prototype nationally designated protected areas database and a protected areas virtual library from UNEP-WCMC.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the World Conservation Union (IUCN) and the UNEP-World Conservation Monitoring Centre (UNEP-WCMC).

6. REFERENCES

(a) **Readings:**

Parks for Life: report of the IVth World Congress on National Parks and Protected Areas. IUCN - The World Conservation Union, Gland, Switzerland. Dinerstein, Eric, David M. Olson, *et al.* 1995.

A conservation assessment of the terrestrial ecoregions of Latin America and the Caribbean. The World Bank, Washington, DC. Ricketts, Taylor, Eric Dinerstein, *et al.* 1999.

A conservation assessment of the terrestrial ecoregions of North America. Volume I—the United States and Canada. Island Press, Washington, DC.

2003 United Nations List of Protected Areas. IUCN, Gland, Switzerland & Cambridge, UK & UNEP-WCMC, Cambridge, UK. Chape, Blyth, Fish, Fox & Spalding (compilers) 2003.

Benefits Beyond Boundaries: Proceedings of the Vth IUCN World Parks Congress. IUCN Gland, Switzerland & Cambridge, UK. 2005.

(b) **Internet sites:**

www.wcmc.org.uk/parks/index.htm

www.iucn.org/themes/wcpa/index.html

United Nations List of Protected Areas 1997.

www.wcmc.org.uk/protected_areas/data/un_97_list.html

www.wcmc.org.uk/parks/index.htm

Annex 3: Revised Methodology Sheet of Indicators on Economic Issues

GENERATION OF WASTE		
Economic	**Consumption and Production Patterns**	**Waste Generation and Management**

1. INDICATOR

(a) **Name:** Generation of Waste.

(b) **Brief Definition:** The amount of waste generated by selected main groups of industries or sectors of the economy, expressed per capita and per unit of GDP. The recommended categories are based on the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 3. and include:

- manufacturing;
- mining and quarrying;
- construction;
- electricity, gas and water supply;
- agriculture, hunting and forestry;
- all other economic activities
- households.

(c) **Unit of Measurement:** kilogrammes per capita per annum and kilogrammes per unit of Gross Domestic Product (GDP) / Value Added at constant prices.

(d) **Placement in the CSD Indicator Set:** Economic / Consumption and Production Patterns / Waste Generation and Management.

2. POLICY RELEVANCE

(a) **Purpose:** The main purpose is to show the trend in the generation of waste produced by different human activities. Waste generation per capita allows comparisons of countries with similar economies, while waste generated per unit of GDP will show if there has been any decoupling of waste generation from economic growth. For each industry or sector selected, the two time series should be shown together to get the full benefit of the indicator.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Sound and efficient use of natural resources is an important part of sustainable development. Waste represents a considerable loss of resources both in the form of materials and energy. The treatment and disposal of the generated waste may cause environmental pollution and expose humans to harmful substances and bacteria, and therefore impact on human health. Generation of waste is intimately linked to the level of economic activity in a country. It reflects society's production and consumption patterns, and wealthier economies tend to produce more waste. In many developed countries, a reduction in the volume of waste generated is an indication of a development towards less material-intensive production and consumption patterns, particularly as the economy moves from a heavy industry base to a more service base.

(c) **International Conventions and Agreements:** No international conventions or agreements exist covering the reduction of waste production. However, there is growing support in countries for the OECD's 3R's approach to tackling waste: Reduction, Reuse, Recycling.

(d) **International Targets/Recommended Standards:** Some countries have set national targets for the reduction of waste within a specified time frame.

(e) **Linkages to Other Indicators:** This indicator is intimately linked to other socio-economic and environmental indicators especially those related to income-level and economic growth. Those would include: rate of growth of urban population, Gross Domestic Product (GDP) per capita, and waste treatment and disposal.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The precise definition of what constitutes waste is variable, but principally it can be considered as materials that are not prime products (i.e. products produced for the market) for which the generator has no further use for his own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. It excludes residuals directly recycled or reused on the site of generation and pollutants that are directly discharged into ambient water or air as waste water or air emission.

Waste is produced through the extraction of raw materials, the production and consumption of goods and services; through the processing of waste from these services (e.g. incineration residues); and through end-of-pipe control or treatment of emissions. Waste statistics usually group waste according to main economic/industrial activities in which they are generated, for example agriculture and forestry waste; mining quarrying waste, construction and demolition waste; waste generated during energy production; manufacturing industries waste and other industrial waste; household and similar waste; and sewage sludge. The importance of these waste categories depends on the economy of the country, and countries may choose to focus only on the activities or sectors which are most relevant for them, or to combine groups of industries because of data constraints.

(b) **Measurement Methods:** To measure the generation of waste, a combination of several methods can be used. To avoid double-counting, it is important to be aware of the point in the waste flow where the data are collected.

The generators of waste will generally have to pay to have waste removed and properly disposed of. Such payments will be based on volumes of waste removed. This data can be collected from the specialist company that removed the waste, by municipalities or by specific surveys to industries, which has the advantage of being able to identify the generating sector.

In areas with municipal waste collection, the amounts of households and similar waste can be estimated on the basis of the amounts of municipal waste collected. In areas without municipal waste collection, amounts can only be estimated through specific studies based on field measurements and household surveys.

(c) **Limitations of the Indicator:** The classification of what is or is not waste is largely dependent on technological innovations achieved and applied; the borderline between waste/non-waste varies

therefore by country, and even within a country. Currently there are no uniform definitions of municipal and industrial waste applied by the countries. The problems of varying definitions and classifications severely limit data comparability between countries or even between regions within countries.

The proper calculation of the indicator would require GDP/ Value Added at constant prices for each of the selected group of economic activity. This is often not available.

Waste production can be expensive to measure at source, unless already done for other purposes, such as billing; thus, consistent and comparable statistics can be difficult to obtain. By definition, the indicator does not cover waste stored on site, although this can also be an environmental or health hazard.

Generation of waste is often treated as a synonym for the amount of waste collected/treated/disposed of, which is measured by recording the weight or volume of waste removed and handled at the treatment or disposal site.

(d) **Status of the Methodology:** Not Available.

(e) **Alternative Definitions/Indicators:** Waste collection, which is easier to measure, may be a suitable proxy measure for this indicator in some countries.

In the absence of data on household waste, municipal waste - defined as waste collected by or on behalf of municipalities - can be used as a proxy. However it should be borne in mind that municipal waste includes waste from households, streets, commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings). It may therefore overlap with some of the industrial sectors. In some countries a non-negligible proportion of household and similar waste is generated in areas with no municipal waste collection, and this needs to be taken into account.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Total weight of waste generated by manufacturing industry, mining & quarrying, construction & demolition, energy production (excluding mining), agriculture & forestry, and households and similar, as well as population data, and GDP and sectoral GDP at constant prices.

(b) **National and International Data Availability and Sources:**

At the national level, data sources would include ministries responsible for the selected economic/industrial activities, ministries responsible for urban affairs and the environment, and statistical agencies. At the international level, the United Nations Statistics Division (UNSD), OECD and Eurostat collect data on waste generation from their member countries, and some good results are available for developed countries. Data for most developing countries is sparse and comparability is limited .

(c) **Data References:**
UNSD Web site (http://unstats.un.org/unsd/environment/q2004indicators.htm).

OECD website (http://www.oecd.org/statisticsdata)
Eurostat website
(http://epp.eurostat.cec.eu.int/portal/page?_pageid=0,1136239,0_45571444&_dad=portal&_schema=PORTAL)

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Statistics Division (UNSD). The contact point is the Chief, Environment Statistics Section, UNSD. fax no. (1 212) 963 0623.

(b) **Other Contributing Organizations:** The United Nations Centre for Human Settlements (Habitat), the United Nations Environment Programme (UNEP), the World Bank, the World Health Organization (WHO), the Organisation for Economic Co-operation and Development (OECD), and Eurostat are involved in the development of waste indicators.

6. REFERENCES

(a) **Readings:** UNSD/UNEP Questionnaire 2004 on Environment Statistics – Waste Section.

Eurostat: A Selection of Environmental Pressure Indicators for the EU and Acceding Countries – 2004 Edition.

Various publications from the Settlement Infrastructure and Environment Programme, Habitat.

OECD. *OECD Environmental Data Compendium 2004.* OECD, Paris, 2004.

European Environment Agency. *Europe's Environment: the third Assessment.* 2003.

International Standard Industrial Classification of All Economic Activities. United Nations, Series M No.4, Rev.3

(b) **Internet site:**

UNSD home page: http://unstats.un.org/unsd/environment/

GENERATION OF HAZARDOUS WASTES		
Economic	**Consumption and Production Patterns**	**Waste Generation and Management**

1. INDICATOR

(a) **Name:** Generation of Hazardous Wastes.

(b) **Brief Definition:** The total amount of hazardous wastes generated per year through industrial or other waste generating activities, according to the definition of hazardous waste as referred to in the Basel Convention and other related conventions (see sections 3(e) and 7 below).

(c) **Unit of Measurement:** Tonnes per unit of Gross Domestic Product (GDP).

(d) **Placement in the CSD Indicator Set**: **Agenda 21:** Economic/Consumption and Production Patterns/Waste Generation and Management.

2. POLICY RELEVANCE

(a) **Purpose:** It provides a measure of the extent and type of industrialization in a country and in this connection the nature of the industrial activities including technologies and processes generating hazardous wastes.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** The generation of hazardous wastes has a direct impact on health and the environment through exposure to this kind of wastes. Normally, long-term exposure is required before harmful effects are seen. Reduced generation of hazardous wastes may indicate either reduced industrial activities in a country, introduction of cleaner production in the industrial processes, or changing patterns in consumers' habits, or changing in national hazardous waste legislation. The introduction of environmentally sound management systems for hazardous wastes implies reduction of risks to health and environment due to lesser exposure to hazardous wastes.

A review of different categories of wastes being generated provides an indication of the nature of industrial activities being undertaken in a country. In the case of other hazardous wastes such as hospital wastes, it is first of all a measure of the size of the population, and secondly, the percentage of this population being treated in hospitals and other medical care units.

(c) **International Conventions and Agreements:** The following conventions and agreements pertain to this indicator: *Basel Convention* on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; *Bamako Convention* on the Ban on the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa; *Waigani Convention* to Ban the Importation of Hazardous and Radioactive Wastes into Forum Island Countries, and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region;

Central American Agreement; Protocol for the *Prevention of Pollution of the Mediterranean Sea* by Transboundary Movements of Hazardous Wastes and Their Disposal; *Organisation for Economic Co-operation and Development (OECD), Council Decisions,* and *EC Council Directives* and Regulation on Waste and Hazardous Wastes.

(d) **International Targets/Recommended Standards:** No quantitative targets exist at the international level. In Agenda 21, Chapter 20, an overall target of "preventing or minimizing the generation of hazardous wastes as part of an overall integrated cleaner production approach" is provided. Targets exist at the national level in many countries.

(e) **Linkages to Other Indicators:** This indicator is linked to the amount of hazardous wastes exported or imported, as well as to the indicators on area of land contaminated by hazardous wastes, and expenditures on hazardous waste treatment or disposal. It is further directly connected to indicators related to material consumption and energy use, including intensity of material use, annual energy consumption per capita, and intensity in energy use. In a wider context, it is also related to the indicators on international cooperation concerning implementation of ratified global agreements.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** In order to facilitate the definition of whether a waste, as defined under the Basel Convention, is hazardous or not, the Technical Working Group established under the Basel Convention has developed lists of wastes that are hazardous and wastes that are not subject to the Convention, as well as an outline of a review procedure for the inclusion, or deletion, of wastes from those lists. These lists were approved at the Fourth Meeting of the Conference of the Parties (UNEP, 1998). It is expected that such lists will considerably facilitate the development and application of indicators of hazardous wastes as mentioned later.

In relation to the definition of hazardous wastes under the Basel Convention (article 1 of the Convention), it should be noted that under article 3 of the Convention, Parties should inform the Secretariat of the Convention (SBC) of wastes, other than those listed in Annexes I and II of the Convention, considered as hazardous under national legislation. Such information is being disseminated by the Secretariat to all Parties in order to enable them to respect such definitions in relation to planned transboundary movements involving such wastes.

(b) **Measurement Methods:** In relation to the Basel Convention, its Secretariat requests information from the Parties to the Convention on a yearly basis regarding the amount of hazardous wastes generated at the national level. This information is being introduced in the SBC database, which includes data and information on hazardous wastes related issues in accordance with Articles 13 and 16 of the Convention. Other agencies, such as OECD, are also collecting information on hazardous wastes generated by OECD countries.

(c) **Limitations of the Indicator:** The problem of defining whether a waste is hazardous or not will, in some cases, cause difficulties in relation to the use of an indicator on hazardous wastes generation. The quantity of the hazardous wastes generated alone may not reflect changes towards a more "sustainable" society. Consideration of the nature of the different kinds of hazardous wastes generated would be a better indicator of sustainable development progress. Availability and accuracy of data represents another limitation of this indicator. Finally, the nature of the waste itself makes it

sometimes difficult to use them as indicators because wastes are often mixed and not produced to specifications.

(d) **Status of the Methodology:** The methodology has not at present been considered by Parties of the Basel Convention. However, Decision V/14 of the Fifth Meeting of the Conference of the Parties requested the Secretariat of the Convention to explore possibilities of developing indicators on hazardous wastes to facilitate decision-making and report thereon to the Conference of the Parties at its sixth meeting.

(e) **Alternative Definitions:** The amounts and type of specific waste streams generated per year through industrial or other waste generating activities as defined in the Basel Convention represents an alternative indicator which would allow for normalization based on hazardous properties of the wastes (e.g., infectious, flammable, toxic, corrosive, ecotoxic).

Consideration of the waste management infrastructure at national level could constitute an indicator on the status of addressing hazardous wastes related issues in any particular country.

In general, hazardous waste indicators, in order to be useful for management, have to have some resonance with policy makers whether they are within the local community, or at the national level. There is, therefore, the need to develop hazardous waste indicators that reflect concern for the hazardous properties of waste, the implications of their impacts on the environment, on ecosystems and their functioning, as well as on human health. A profile or set of indicators that can address these multiple issues and meet the needs of a variety of users is essential. Such indicators would be broader than the indicator on generation of hazardous wastes as referred to in this paper and the Secretariat of the Basel Convention will take the lead in the further development of indicators on hazardous wastes in collaboration with relevant institutions.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Data on the generation of hazardous wastes.

(b) **National and international Data Availability and Sources:** Data are available for many developed countries, but, so far, few developing countries are collecting data on hazardous waste generation. The Parties of the Basel Convention are requested to provide data to the Conference of the Parties through the Secretariat of the Convention on a yearly basis.

Assistance to developing countries will be needed in identifying the main hazardous waste streams being generated in their countries in order to prepare and maintain inventories of hazardous wastes. In this connection difficulties may be encountered in relation to hazardous waste generation by small scale enterprises, since they are scattered and often operating on an informal basis and are therefore not registered. It may be less of a problem to identify amounts of hazardous wastes generated by larger industries, since they are normally registered.

(c) **Data References:** The primary source of data at the international level is the Secretariat of the Basel Convention.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the Secretariat to the Basel Convention (SBC), United Nations Environment Programme (UNEP). The contact point is the Executive Secretary, SBC; fax no. (41 22) 797 3454, e-mail: sbc@unep.ch.

(b) **Other Contributing Organizations:** Other organizations include: United Nations Statistics Division, UNEP, ICRED, OECD, European Topic Centre for Wastes, Denmark, US Environmental Protection Agency, Institute for Applied Environmental Economics, the Netherlands, European Institute of Business Administration, France, Technical University, Graz, Austria, Wuppertal Institute, CEFIC, Netherlands National Institute of Public Health and Environment, Canada. Additional organizations with expertise in the domaine of hazardous waste generation are: UN-ECE (Transport); IMO (Maritime); FAO (Pesticides); WHO; ILO; IAEA; UNIDO, SPREP.

6. REFERENCES

(a) **Readings:**

Basel Convention for the Control of Transboundary Movement of Hazardous Wastes and their Disposal.

Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, 1991.

Waigani Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region.

Protocol for the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and Their Disposal.

Bakkes, J.A. et al. *An Overview of Environmental Indicators: State of the Art and Perspectives.* Environment Assessment Technical Reports. Netherlands National Institute of Public Health and Environmental Protection in cooperation with the University of Cambridge, United Kingdom. June 1994.

Å. Granados and P.J. Peterson *"Hazardous Waste Indicators for National Decision-makers"*, Journal of Environmental Management (1999).

1. Reporting and Transmission of Information under the Basel Convention for the year 1993. Geneva, 1996.

2. Reporting and Transmission of Information under the Basel Convention for the year 1994. Geneva, June 1997, document SBC No. 97/014, 175 p.

3. Reporting and Transmission of Information under the Basel Convention for the year 1995. Geneva, May 1999, document SBC No. 99/004, 130 p.

4. Reporting and Transmission of Information under the Basel Convention for the year 1996. Geneva, June 1999, document SBC No. 99/006, 178 p.

5. Reporting and Transmission of Information under the Basel Convention for the year 1997: Part II (Statistics on generation and transboundary movements of hazardous wastes and other wastes). Basel Convention Series SBC No. 99/001, Geneva, November 1999, 148 p.

(b) **Internet sites:**

Secretariat of the Basel Convention: http://www.basel.int/

European Topic Centre on Waste: http://www.etc-waste.int/

MANAGEMENT OF RADIOACTIVE WASTE		
Economic	**Consumption and Production Patterns**	**Waste Generation and Management**

1. INDICATOR

(a) **Name:** Management of Radioactive Waste.

(b) **Brief Definition:** Radioactive waste arises from various sources, such as nuclear power generation and other nuclear fuel cycle related activities, radioisotope production and use for applications in medicine, agriculture, industry and research. The indicator provides a measure of both the current status of radioactive waste management at any point in time and the progress made over time towards the overall sustainability of radioactive waste management.

(c) **Unit of Measurement:** a dimensionless indicator ranging from 0 (least sustainable condition) to 100 (most sustainable condition) in increments dependent on the progress towards safe storage or disposal. The factor may be calculated for each waste class used by a country or it may be presented as an average for all waste classes.

(d) **Placement in the CSD Indicator Set:** Economic/Consumption and production patterns/Waste generation and management.

2. POLICY RELEVANCE

(a) **Purpose:** The purpose is to represent the progress in managing the various radioactive wastes that arise from the nuclear fuel cycle and/or from nuclear applications. Quantitative information is required to indicate this progress by way of a baseline for full sustainability coupled with a knowledge of the key steps towards full sustainability.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Radioactive waste, if not properly managed, can have a direct impact on health and the environment through exposure to ionizing radiation. In order to protect human health and the environment, appropriate waste management strategies and technologies must be employed. Fundamental principles of radioactive waste management, as well as activities such as minimization of waste arisings, involve systematically considering the various steps in treatment, conditioning, storage and disposal. Effective management of waste (control of inventory) has a positive impact regarding sustainability as it reduces the pressure on the environment and the commitment of resources. Waste management strategies seek ultimately to confine and contain the radionuclides within a system of engineered and natural barriers so that any releases to the environment are small compared to natural background.

(c) **International Conventions and Agreements:** The Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management [Ref 1] entered into force June 2001. This convention binds Contracting Parties to manage spent nuclear fuel and radioactive wastes using sustainable waste management practices.

(d) **International Targets/Recommended Standards:** The International Atomic Energy Agency (IAEA) has established Safety Standards, Fundamentals, Requirements and Guides [Ref 2 - 4] applicable to the management of radioactive wastes. It has also established Basic Safety Standards for the Protection of Humans against Ionizing Radiation [Ref 5], that are consistent with recommendations of the International Commission on Radiological Protection (Ref 6,7).

(e) **Linkages to Other Indicators:** A large portion of radioactive waste arises from practices within the nuclear fuel cycle, therefore major current arisings are related to a significant generation of electricity by nuclear means with an equivalent reduction of environmental impacts by other energy sources (Chapter 4 of Agenda 21). This implies a reduction in the release of atmospheric pollutants; notably greenhouse gases, contributing to the protection of the atmosphere (Chapter 9 of Agenda 21). Since some radioactive waste arises from medical applications, such as treatment with radioisotopes or sealed radiation sources and nuclear medicine research, a link exists with the extent of these applications and with the protection and promotion of human health (Chapter 6 of Agenda 21). Additional links are with the transfer of environmentally sound technology (Chapter 34 of Agenda 21) and with the environmentally sound management of hazardous waste (Chapter 20 of Agenda 21).

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Principles regarding the protection of future generations are formulated in the International Atomic Energy Agency's Safety Fundamentals [Ref. 4]. IAEA definitions and the classification of radioactive waste are given in relevant standards, accessible via [Ref 8].

(b) **Measurement Methods:**. Management progress is measured against key milestones related to both the processing of waste into forms suitable for either safe storage or for placement into a designated endpoint (the “form factor”) and to the placement of waste into an endpoint facility (“endpoint factor”). Each factor has four states with values assigned according to specified milestones. Determination of progress to towards sustainable waste management requires a knowledge of the status of the designated milestones, which is in turn related to (1) the rate of waste generation, (2) the rate that wastes are put into suitable forms and (3) the rate that wastes are placed into an endpoint facility. All rates have units m3/a or tonnes/a (mass is typically used for spent nuclear fuel that is declared to be waste). A five year moving average is recommended for the determination of these rates. Details of the methodology to calculate the indicator can be obtained via the contact point identified in Point 5 below or via the link “GUIDANCE FOR CALCULATING THE INDICATOR OF SUSTAINABLE DEVELOPMENT FOR RADIOACTIVE WASTE MANAGEMENT” before Point 4 below.

(c) **Limitations of the Indicator:** The management of radioactive waste is only a first approximation of its hazard. It is assumed that only improperly managed waste can have an impact on human health and the environment. The actual impact requires a site specific analysis taking into account the isotopic and chemical composition of the waste. This indicator gives a measure of progress towards reduction in the volume of waste that could impact upon health and the environment. As configured, this indicator does not seek to establish progress with historic waste management.

(d) **Status of the Methodology:** Safety assessment of the radiological hazard of radioactive waste disposal is considerably advanced and is used as the basis for regulatory decisions in many countries (the milestones of factors are related to specified regulatory decisions, such as the approval of a disposal facility for operation).

(e) **Alternative Definitions/Indicators:** None.

GUIDANCE FOR CALCULATING THE INDICATOR OF SUSTAINABLE DEVELOPMENT FOR RADIOACTIVE WASTE MANAGEMENT

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** the volumes or masses of the various classes of radioactive waste (1) arising annually, (2) processed to suitable forms and (3) consigned to an endpoint facility expressed in cubic metres per annum (m3/a) or tonnes per annum (tonnes/a) plus a knowledge of the status of specified milestones for the form and endpoint factors

(b) **National and International Data Availability and Sources:** At the national level, the volume or masses of radioactive waste arisings can be obtained from the waste accountancy records maintained by the various waste generators or, in consolidated form, from either national waste management organizations or regulatory bodies. Almost one third of the IAEA member states keep some type of national radioactive waste registry. The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management requires Contracting Parties to report an inventory of radioactive waste that is subject to the Convention. Through this mechanism, both the availability and the quality of data is likely to increase over time.

(c) **Data References**: The primary source for data includes national or provincial/state level governmental organizations. A secondary source may be databases managed by international organizations such as the IAEA or the Nuclear Energy Agency of the Organization of Economic Cooperation and Development (OECD/NEA).

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency**: The International Atomic Energy Agency. The contact point is:

Indicator of Sustainable Development for Radioactive Waste Contact Point
International Atomic Energy Agency
Department of Nuclear Energy
Division of Nuclear Fuel Cycle and Waste Technology
Waste Technology Section
Wagramer Strasse 5, P.O. Box 100
A-1400, Vienna, Austria
E-mail: ISD-RW@iaea.org

(b) **Other Contributing Organizations**: Governments and inter-governmental organizations, possibly the European Commission (EC), the OECD/NEA, the United Nations Environment Programme (UNEP), non-governmental and other organizations, such as the International Union of Producers and Distributors of Electrical Energy (UNIPEDE) and the Electric Power Research Institute (EPRI).

6. REFERENCES:

[1] *The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, as adopted in September 1997 (IAEA Press Release PR 2001/05, 20 March 2001, http://www.iaea.org/worldatom/Press/P_release/2001/prn0105.shtml).

[2] IAEA's Safety Guides (Safety Series No. 111-G-1.1), 1994, *Classification of Radioactive Waste.*

[3] IAEA's Safety Standards (Safety Series No. GS-R-1), 2000, *Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety*.

[4] IAEA's Safety Fundamentals (Safety Series No. 111-F), 1995. *The Principles of Radioactive Waste Management.*

[5] IAEA's Safety Standards (Safety Series No. 115), 1996. *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources.*

[6] ICRP Publication 46, 1996. *Radiation Protection Principles for the Disposal of Solid Radioactive Waste,* Pergamon Press, Oxford.

[7] ICRP Publication 60, 1991. 1990 *Recommendations of the International Commission on Radiological Protection.* Annals of the ICRP 21 (1- 3), Pergamon Press, Oxford.

[8] WorldAtom Internet site: www.iaea.org / worldatom /

WASTE TREATMENT AND DISPOSAL		
Economic	**Consumption and Production Patterns**	**Waste Generation and Management**

1. INDICATOR

(a) **Name:** Waste Treatment and Disposal

(b) **Brief Definition:** Percentage of Waste which is *i*) recycled and composted; *ii*) incinerated and *iii*) landfilled on a controlled site.

(c) **Unit of Measurement:** %.

(d) **Placement in the CSD Indicator Set**: Economic/Consumption and Production Patterns/ Waste Generation and Management.

2. POLICY RELEVANCE

(a) **Purpose:** The purpose of this indicator is to measure the proportion of waste generated which is recycled (including composted), incinerated, or landfilled on a controlled site. It gives an indication of the environmental impact of waste management in the country. The proper treatment and disposal of waste is important from an environmental and social viewpoint but can be an economic burden on industries, municipalities and households.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** The way a country manages its solid waste has significant long-term implications for public health, the economy and the natural environment. Therefore it is essential to promote an environmentally sound solid waste treatment and disposal programme. Generally, adequate waste management indicates that the authorities are aware of the health and environmental risks and that they support or impose suitable measures to prevent or reduce waste. Solid waste recycling and composting is an important component of a sustainable approach to solid waste management. As well as reducing the amount of waste that needs to be disposed of, increasing the amount of waste recycled and composted reduces the demand for raw materials, leading to a reduction in resource extraction. There may also be a benefit of increased income generation for the urban poor through recycling schemes.
For waste that is not suitable for recycling, incineration is often considered the next best option, if the incineration plants comply with legislation for emission standards, and if energy from waste incineration is recovered, as this will reduce the overall volume of waste.
If recycling or incineration is excluded, waste should be landfilled on a controlled site, with suitable technical control in line with national legislation. Uncontrolled landfilling may cause serious environmental problems to soil and ground water and should be avoided.

(c) **International Conventions and Agreements:** While no international agreements currently apply, there is growing international backing for the OECD's 3R's approach to tackling waste: Reduction, Reuse, Recycling.

(d) **International Targets/Recommended Standards:** No specific target for waste treated in different categories. Some developed countries have established voluntary targets for the proportion of waste recycled.

(e) **Linkages to Other Indicators:** This indicator is intimately linked to other solid waste management indicators. It is also associated with some of the indicators for human settlements and financial mechanisms, such as percent of population in urban areas, and environmental protection expenditures.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The amount of waste treated or disposed of under different methods is closely related to the national policy on waste management: incentives for minimisation, recycling/recovery, stricter legislation for waste to be landfilled (e.g. ban on landfilling of combustible waste) and differentiated taxation.

Recycling is defined as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Direct recycling within industrial plants at the place of generation should be excluded.

Composting is one type of recycling, and is defined as a biological process that submits biodegradable waste to anaerobic or aerobic decomposition, resulting in a product (compost) that is added to soil to improve fertility.

Incinerating is thermal treatment of waste during which chemically fixed energy of combusted matters is transformed into thermal energy. Combustible compounds are transformed into combustion gases leaving the system as flue gases. Incombustible inorganic matters remain in the form of slag and fly ash. Incinerating includes incinerating with or without energy recovery.

Landfilling is defined as depositing waste into or onto land, in a controlled or uncontrolled manner. It includes specially engineered landfill and temporary storage of over one year on permanent sites. The definition covers both landfill in internal sites (i.e. where a generator of waste disposes of its own waste at the place of generation) and in external sites. Landfill waste includes all amounts going to landfill, either directly or after sorting and/or treatment. Controlled landfilling requires submission to a permit system and technical control procedures in compliance with the national legislation in force.

(b) **Measurement Methods:** To measure the proportion of waste under different treatments, a combination of several methods can be used. It is important to be aware of where in the waste flow the data are collected to avoid double-counting.

Municipalities or industries should have data about waste managed by them. Also, waste management and disposal facilities such as recycling plants, incineration plants and landfills should be aware of the amounts they are processing. Waste collection companies are another potential

source of data. However, data can be scattered and time consuming to collect and compile for indicator purposes. Specific surveys to operators mentioned above might be required.

Material flow analyses will also provide a source of waste data.

(c) **Limitations of the Indicator:** Although the indicator gives relevant information about the existence and use of different waste treatment and disposal facilities, it does not give the full picture. For example, it does not give any indication of the level of control of the landfill sites, or the emissions of incineration plants. And in many countries, after the waste has been dumped at a landfill site, it may be sorted mechanically or by scavengers and a fraction removed for reuse or recycling. It can be difficult to quantify this fraction. For practical reasons, the calculation of the waste incineration rate only considers waste incinerated through the registered waste management system. Households or industries incinerating their own waste are not included. Similarly, households and industries composting their own waste are not covered. The calculation of landfill rate usually does not consider the waste which is disposed of at illegal dumps.

(d) **Status of the Methodology:** Not Available.

(e) **Alternative Definitions/Indicators:** The solid waste recycling rate would be more useful if expressed in terms of particular waste streams, e.g. percentage of paper waste recycled. It may also be useful to express the % recycled based on the usage of a particular commodity, for example volume of aluminium recycled per volume produced. This enables a better estimation of the level of resource conservation. The percentage of waste incinerated can be divided into two: incineration with or without energy recovery. Landfills could be subdivided into controlled and uncontrolled landfills.

Since the total amount of solid waste treatment and disposal are difficult to measure, municipal waste treatment and disposal might be a viable alternative indicator.

The indicator could also be presented as the percentage of waste collected, rather than of total waste generated, as data on the latter can be difficult to obtain.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Total waste generated, weight of total waste recycled, weight of total waste incinerated, and weight of total waste landfilled.

(b) **National and International Data Availability and Sources:**

At national level, data sources would include ministries responsible for urban affairs and the environment, and statistical agencies. At the international level, the United Nations Statistics Division (UNSD), OECD and Eurostat collect available data on municipal and hazardous waste treatment and disposal from countries. Currently, some good results are available from developed countries, but data for developing countries are very scarce.

(c) **Data References:** UN Statistics Division Web site (http://unstats.un.org/unsd/environment/q2004indicators.htm).

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Statistics Division (UNSD). The contact point is the Chief, Environment Statistics Section, UNSD. fax no. (1 212) 963 0623.

(b) **Other Contributing Organizations:** The United Nations Centre for Human Settlements (Habitat), the United Nations Environment Programme (UNEP), the World Health Organization (WHO), OECD, Eurostat and industry associations would be interested in the development of this indicator.

6. REFERENCES

(a) **Readings:**

UNSD/UNEP Questionnaire 2004 on Environment Statistics – Waste Section.

Various publications from Eurostat.

UNEP. *Global Environmental Outlook* 2003

United Nations Department of Economic and Social Affairs, *Measuring Changes in Consumption and Production Patters: A Set of Indicators*, (ST/ESA/264), 1998.

(b) **Internet site:**

UNSD home page: http://unstats.un.org/unsd/environment/

DISTANCE TRAVELLED PER CAPITA BY MODE OF TRANSPORT		
Economic	**Consumption and Production Patterns**	**Transportation**

1. INDICATOR

(a) **Name:** Distance travelled per capita by mode of transport.

(b) **Brief Definition:** The number of kilometres travelled per person in a given year by different modes of transport.

(c) **Unit of Measurement:** Kilometers per year.

(d) **Placement in the CSD Indicator Set:** Economic / Consumption and Production Patterns / Transportation.

2. POLICY RELEVANCE

(a) **Purpose:** This indicator can contribute to monitoring the environmental impact and sustainability of the systems for personal mobility in a particular country or area.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Travel is an essential part of the economic and social life of a country. Non-motorised travel has low environmental impact, and due to the level of physical exertion involved, also brings health benefits. However, it is only suitable for local journeys. Motorised travel is the only suitable means of travelling longer distances, but has greater environmental and social impacts, such as pollution, global warming, and accidents. Sustainability implies using the most appropriate mode of transport for the journey in question and decoupling travel from economic development. Policies are needed which reduce the need for travel, support a shift towards less environmentally damaging means, provide incentives for changes in lifestyle, increase safety, and improve the standard of public transport (transit).

(c) **International Conventions and Agreements:** Not applicable, see section 3 (d) below.

(d) **International Targets/Recommended Standards:** No international targets have been established.

(e) **Linkages to Other Indicators:** This mobility indicator is linked to GDP per capita, time spent on travelling, percent of population in urban areas, urban transit and automobile use, fossil fuel use by automobiles, infrastructure expenditure and ambient concentrations of pollutants in urban areas. Various other indicators of land use and settlement patterns are also related.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** The aim of this indicator is to quantify the use of different modes of transport by people (passengers). The indicator, ideally, should be broken down into the following modes of transport: walking, cycling, passenger cars, motorcycles and mopeds, buses and coaches, train, ship, and plane. For developing countries, other means of transport (donkey, ox-cart, rickshaw, etc.) may need to be considered. A further breakdown by purpose would provide useful additional information. In practice, current statistics allow to calculate, in the best cases, only the performance of motorised travel by road, rail, sea and air.

(b) **Measurement Methods:** Total passenger-kilometers travelled per year divided by the total population, according to the different modes of transport.

(c) **Limitations of the Indicator:** Ideally, the indicator would measure the distance travelled by the population of a country both within and outside their country. In practice, national passenger-kilometer statistics normally include movements of all people within the national territory (regardless of their normal place of residence), and exclude movements outside their territory. Furthermore, the reliability of passenger-kilometre statistics leaves much to be desired. The indicator has an inbuilt bias against the longer distance modes of transport, especially planes. To some extent this can be offset by splitting the indicator by purpose (shopping, travel to school or work, professional travel, pleasure).

This indicator measures only distance travelled by passengers and does not cover goods transport. In order to monitor efficiency changes in the transport sector, an indicator such as transport performance divided by vehicle performance (passenger-kilometers / vehicle-kilometers by mode of transport) could be considered.

(d) **Status of the Methodology:** An agreed methodology at the international level concerning passenger transport statistics has not yet been established and no specific projects on this direction are known at present. National definitions are being used.

(e) **Alternative Definitions/Indicators:** An alternative would be to use number of trips for different purposes. This would counter the bias against longer distance modes.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:**

(i) Passenger-kilometer data by means of transport (as indicated in section 3(a) above);
(ii) Population.

(b) **National and International Data Availability and Sources:** Passenger-kilometer data for at least some modes of transport, and population data are regularly available for most countries at the national level; and for some countries, at the sub-national level. Both types of data are compiled by and available from national statistical offices and various professional organizations.

(c) **Data References:**

Eurostat: Transport Annual Statistics.

ECMT: Statistical Trends in Transport.

UNECE: Annual Bulletin of Transport Statistics for Europe.

International Road Federation: World Road Statistics.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is Eurostat (the Statistical Office of the European Communities). The contact point is Ms.Ovidio Crocicchi, fax no, 352 4301-332839.

(b) **Other Contributing Organizations:** Other organizations involved in the indicator development include International Road Transport Union (IRU), UIC (Union international des chemins de fer) and the United Nations Economic Commission for Europe (UNECE).

6. REFERENCES

(a) **Readings:**

"Energy and transport in figures", Statistical Pocketbook, EU Commission, 2004.

“Energy, transport and environment indicators”, Pocketbook, Eurostat, 2004

“Transport and Environment – Statistics for the Transport and Environment Reporting Mechanism (TERM) for the European Union”, 2000.

“Are we moving in the right direction? Indicators on transport and the environment integration in the EU”, European Environment Agency, 2000.

(b) **Internet site:** http://europa.eu.int/comm/eurostat

Annex 4: Revised Methodology Sheets of Indicators on Institutional Issues

NUMBER OF INTERNET USERS PER 100 POPULATION		
Institutional	**Institutional Capacity**	**Information Access**

1. INDICATOR

(a) **Name:** Internet Users per 100 population.

(b) **Brief Definition:** Internet users are those who use the Internet from any location. The Internet is defined as a world-wide public computer network that provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files. Internet access may be via a computer, Internet-enabled mobile phone, digital TV, games machine etc. Location of use can refer to any location, including work. The indicator is derived by dividing the number of Internet users by total population and multiplying by 100.

(c) **Unit of Measurement:** Number of users per 100 population.

(d) **Placement in the CSD Indicator Set:** Institutional / Institutional Capacity / Information Access.

2. POLICY RELEVANCE

(a) **Purpose:** The number of Internet users is a measure of Internet access and use.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** As an information distribution system, the Internet and its usage provide opportunities for bringing education and information within the reach of all. It can significantly shorten time lags as well as opening up a new range of information resources. It also opens up significant, new economic opportunities as well as possibilities for more environment-friendly options for the marketplace. The Internet can allow businesses from developing nations to leapfrog into the development mainstream and offers considerable promise in facilitating the delivery of basic services, such as health and education, which are unevenly distributed at present.

(c) **International Conventions and Agreements:** The four-year strategic Istanbul Action Plan (IsAP) adopted by the ITU World Telecommunication Development Conference in 2002 provides a six-point action plan that address the key elements needed to bridge the digital divide. It includes a special programme to take into consideration the needs of least developed countries.

(d) **International Targets/Recommended Standards:** "The benefits of new technologies, especially information and communication technologies should be available to all", United Nations Millennium Declaration, 55 / 2.

(e) **Linkages to Other Indicators:** There are also other variables (e.g., hosts and subscribers) which provide a measure of how many people are accessing the Internet. This indicator is also related to other telecommunication indicators (e.g. main telephone lines, mobile cellular subscribers), as well as income and education indicators.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts.** The Internet is a linked world-wide network of computers in which users at any one computer can, if they have permission, get information from other computers in the network. For most developed and larger developing nations, Internet users data are based on methodologically sound user surveys conducted by national statistical agencies or industry associations. These data are either directly provided to the ITU by the country concerned or the ITU does the necessary research to obtain the data. For countries where Internet user surveys are not available, the ITU calculates estimates based on average multipliers for the number of users per subscriber. The ITU is currently, through the *Partnership on Measuring ICT for Development*, trying to get more countries to collect more, better, and harmonized Internet users data[5]. The number Internet users are part of the core list of ICT indicators, which has been adopted by this Partnership. This means that more countries will start to collect this data through official surveys (such as a stand-alone household ICT survey or as a modules to existing household surveys) and that the quality of data should improve over time.

(b) **Measurement Methods:** Internet users data are collected through Internet user surveys. For countries where Internet user surveys are not available, data can be estimated based on average multipliers for the number of users per Internet subscriber.

(c) **Limitations of the Indicator:** Data for the indicator is not universally available in most developing countries although improvements in this area are currently being made.

(d) **Status of the methodology:** In the past, the number of Internet users was often based on multipliers (e.g., a certain number per Internet subscriber). As the commercialisation of the Internet has grown, so has the use of Internet use surveys by both market research companies as well as statistical offices to count the number of Internet users.

(e) **Alternative Definitions**:

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Total population, number of Internet users.

(b) **National and International Data Availability and Sources:** A number of government agencies, typically communication regulators and national statistical agencies are compiling country-level Internet user data. At the international level, the International Telecommunication Union collects data across countries.

(c) **Data References:** *World Telecommunication Indicators Database*, International Telecommunication Union; *World Telecommunication Development Report*, ITU; Y*earbook of Statistics*, ITU.

[5] The Partnership on Measuring ICT for Development was launched in June 2004, and currently includes the following members: Eurostat, ITU, OECD, UNCTAD, four UN Regional Commissions (ECA, ECLAC, ESCAP, ESCWA), UIS, the UN ICT Task Force and the World Bank. For further information on the objectives and activities of the Partnership, see http://www.itu.int/ITU-D/ict/partnership/.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the International Telecommunication Union (ITU). The contact point is the Head, Market, Economic and Finance Unit, Telecommunication Development Bureau (BDT), ITU; fax no. (41-22) 730-6449.

(b) **Other Contributing Organizations:** None.

6. REFERENCES

(a) **Readings:**

World Telecommunication Report, various years, ITU

Telecommunication Indicator Handbook

(b) **Internet site:** http://www.itu.int/**ict**

FIXED TELEPHONE LINES AND CELLULAR SUBSCRIBERS PER 100 POPULATION		
Institutional	**Institutional Capacity**	**Communications Infrastructures**

1. INDICATOR

(a) **Name:** Fixed telephone lines and cellular subscribers per 100 population

(b) **Brief Definition:** The indicator is derived by dividing the number of fixed telephone lines and mobile cellular subscribers by the population and multiplying by 100.

(c) **Unit of Measurement:** Measured as the % of population. .

(d) **Placement in the CSD Indicator Set:** Institutional / Institutional Capacity / Communications Infrastructures.

2. POLICY RELEVANCE

(a) **Purpose:** This indicator is the broadest and most common measurement of the degree of telecommunication development in a country.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Telecommunications and social, economic, and institutional development are closely linked. Modern communications is considered to be relatively benign to the environment. There is unlikely to be sustainable development without a well-developed communications infrastructure. Communications is critical to support sustainable development.

(c) **International Conventions and Agreements:** None.

(d) **International Targets/Recommended Standards:** Not available.

(e) **Linkages to Other Indicators:** The linkages between this indicator and other sustainable development indicators are many. For instance, a well-developed communication infrastructure will reduce the need for transport with beneficial effects on the environment. Another example is the requirement of telecommunications for the innovative delivery of health and educational services. Yet, another example is the potential of telecommunications for reducing economic and social gaps within an economy and assisting to reduce the need for urbanization. Access to telecommunications provides those in rural and remote areas with contact to the outside world, reducing their sense of isolation and providing them with a tool to improve economic, social and cultural awareness.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** Fixed telephone lines refer to telephone lines connecting a customer's terminal equipment (e.g., telephone set, facsimile machine) to the Public Switched Telephone Network (PSTN) and which have a dedicated port on a telephone exchange. Mobile cellular subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology, which provides access to the PSTN.

(b) **Measurement Methods:** The indicator is derived by dividing the number of fixed telephone lines and mobile cellular subscribers by the population and multiplying by 100.

(c) **Limitations of the Indicator:** There is concern that fixed lines per 100 inhabitants does not always accurately reflect the degree of telecommunications development. First, there are other indicators of telecommunication development such as data network subscribers. Second, fixed lines on a country level does not indicate the breakdown of the distribution of lines into business or residential or urban and rural although this disaggregated information is available. The indicator provides no measure of the quality or reliability of the telephone service.

(d) **Status of the methodology:** The indicator is widely used in over 200 economies around the world.

(e) **Alternative Definitions:** If accessibility is a main interest, then the number of households with telephone (fixed or mobile) service may be more relevant especially for countries which have large households.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** The data needed to compile the indicator are fixed telephone lines, mobile cellular subscribers and population.

(b) **National and International Data Availability and Sources:** The International Telecommunications Union (ITU) collects this information on an annual basis. Data are available for 1960, 1965, 1970, and annually from 1975 onwards. Population data is widely available from UN agencies.

(c) **Data References:** *World Telecommunication Indicators (WTI)* database, International Telecommunication Union; *World Telecommunication Development Report*, ITU; *Yearbook of Statistics*, ITU.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the International Telecommunications Union (ITU). The contact point is the Head, Market, Economics and Finance Unit, ITU; fax no. (41 22) 730 6449.

(b) **Other Contributing Organizations: None.**

6. REFERENCES

(a) **Readings:**

Definitions, methodology and other information regarding telecommunication indicators can be found in the ITU's *Telecommunication Indicator Handbook.*

Application of the indicator including country data can be found in the ITU's *World Telecommunication Development Report.* The data are also provided by the ITU to other agencies and appear in the following publications: UN *Statistical Yearbook,* World Bank *World Development Indicators,* UNDP *Human Development Repor*t, and OECD *Communication Outlook and EUROSTAT Communications Statistics.*

(b) **Internet site:** http://www.itu.int**/ict**

HUMAN AND ECONOMIC LOSS DUE TO DISASTERS		
Institutional	**Institutional Capacity**	**Disaster Preparedness and Response**

1. INDICATOR

(a) **Name:** Human and economic loss due to disasters caused by vulnerability to natural hazards.

(b) **Brief Definition:** The number of persons deceased, missing, and/or injured as a direct result of a disaster involving natural hazards; and the amount of economic and infrastructure losses incurred as a direct result of the natural disaster.

(c) **Unit of Measurement:** Number of fatalities; $US.

(d) **Placement in the CSD Indicators Set:** Institutional/Institutional Capacity/Disaster Preparedness and Response.

2. POLICY RELEVANCE

(a) **Purpose:** To provide estimates of the human and economic impact of disasters in order to measure the trends in population vulnerability and to determine whether a country or province is becoming more or less prone to the effects of disasters.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Disaster involving natural hazards can have devastating short and long-term impacts on the society and the economy of any country, adversely affecting progress towards sustainable development. They cause loss of life, social disruption and affect economic activities. This is particularly true for highly vulnerable, low-income groups. They also cause environmental damage, such as loss of fertile agricultural land, and water contamination. They affect urban settlements and may result in major population displacements.

The general increase in vulnerability of societies worldwide has caused the social, economic and environmental impact of disaster involving natural hazards to become far greater now than ever before. In fact, the overall number of people affected by disasters has been growing by 6% each year since 1960. This trend is expected to continue primarily because of increased concentration of people and values in the areas exposed to natural hazards, such as floods and earthquakes.

(c) **International Conventions and Agreements:** Based on the experience of the International Decade for Natural Disaster Reduction, the UN General Assembly adopted resolution A/54/219 which established a permanent mandate for the UN system in the field of disaster reduction, in the framework of the global programme named International Strategy for Disaster Reduction (ISDR).

(d) **International Targets/Recommended Standards:** None.

(e) **Linkages to Other Indicators:** This indicator is linked with indicators that are related to issues of vulnerability: % Population Living Below Poverty Line, Floor Area Per Person, Population Growth Rate, Population of Urban Formal and Informal Settlements, Area of Urban Formal and Informal Settlements, and other institutional indicators like National Sustainable Development Strategy.

This indicator would have greater significance if correlated to indicators of vulnerability to specific hazards such as earthquakes and floods, which account for the majority of loss due to natural disasters, especially in developing countries and if related to the number of people leaving in high-risk areas.

3. METHODOLOGICAL DESCRIPTION

(a) **Underlying Definitions and Concepts:** There is a recognized high degree of interdependency between sustainable development and vulnerability to natural hazards. High vulnerability means higher exposure to natural catastrophes in the absence of disaster risk reduction measures. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries. Therefore, the degree of vulnerability to a given natural hazard provides a key measure of social welfare and development in a given country, as well as an indication of the risk (probability) of a disasters.

For the purpose of this indicator, the following definitions have been used:

Disaster involving natural hazards is the consequence of the impact of a natural hazard on a socio-economic system with a given degree of vulnerability, which overwhelms local capacity to respond to the emergency and has disruptive consequences on human, social and economic parameters.

Natural hazards comprise phenomena such as earthquakes; volcanic activity; landslides; tsunamis; tropical cyclones and other severe storms; tornadoes and high winds; river floods and coastal flooding; wildfires and associated haze; drought; infestations.

Vulnerability to hazards is a function of human activities. It describes the degree to which a socio-economic system is susceptible to the impact of natural and other related hazards. Vulnerability also depends on aspects such as hazard awareness, the characteristics of human settlements and infrastructure, public policy and administration, and organized abilities in all fields of disaster management. At present, poverty is one major cause of vulnerability in many parts of the world.

(b) **Measurement Methods:** The measurement methods proposed are based on the criteria used by the Centre for Research on the Epidemiology of Disaster (CRED). The data elements included here have been selected and modified according to the requirements of the sustainable development indicator methodology sheets. Overall, these data should be collected and validated at the country level by a public authority using these standard criteria and methods. Each element is presented first in a concise description, followed by comments and the proposed recording procedure.

i) *Onset Date:* This establishes the date when the disaster situation occurred. This date is well defined for all sudden-impact disasters. For disaster situations which develop gradually overtime

(for example, drought) scientific (meteorology and seismology institutes) and governmental (civil defence authorities) sources.

ii) *Declaration Date:* The date when the first call for external assistance concerning the disaster is issued. This call for external assistance mentioned here is defined according to the definition of a disaster situation stated above. This date is available for all disaster situations to be included for the indicator. Only the date of the first appeal for external assistance is recorded.

iii) *Disaster Type:* This describes the disaster according to a pre-defined classification scheme. Disaster types should include all types of natural disasters, for example, earthquakes, cyclones, floods, volcanic eruptions, drought, and storms. Disasters may be further described as sudden onset, such as earthquakes and floods, and long-term, such as drought. Two or more disasters may be related, or other disaster types may occur as a consequence of a primary event. For example, a cyclone may generate a flood or landslide; or an earthquake may cause a gas line to rupture.

iv) *Country:* This defines the country in which the disaster occurred. Every disaster record will be by country. Autonomous regions, not yet recognised as countries, will not be used. The same disaster may affect more than one country, and here separate records are maintained.

v) *Fatalities:* This includes persons confirmed dead and persons missing and presumed dead. Official figures are used whenever available. The figure is updated as missing persons are confirmed to be dead.

vi) *Estimated Amount of Damage:* This represents the value of all damages and economic losses directly related to the occurrence of the given disaster. The economic impact of a disaster usually consists of direct (for example, damage to infrastructure, crops, housing) and indirect (for example, loss of revenues, unemployment, market destabilisation) consequences on the local economy. Although several institutions have developed methodologies to quantify these losses in their specific domain, no standard procedure to determine a global figure for the economic impact exists. Three different figures are recorded from sources which have a well-defined methodology for the assessment of economic impacts, including the World Bank and other international lending agencies; the host government; and, especially in the case of complex emergency situations, the total budget requirements listed in the consolidated appeals launched by UN agencies and other major non-government organizations.

(c) **Limitations of the Indicator:** The validity of this indicator is limited by the quality and the format of the data used for its calculation. Comparability over time may represent a particular problem for this indicator.

(d) **Status of the Methodology:** The methodology is in widespread use on both developed and developing countries although it is not standardized.

(e) **Alternative Definitions:** If the indicator has to reflect changing risk, the measurement should be losses per unit of time per capita. This is not possible without further development of the indicator methodology.

4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** As described in 4.b.

(b) **National and International Data Availability and Sources:** Data above is normally available within each country or easily obtainable; other sources are international scientific associations; insurance companies (Munich Re, Swiss Re), national geological survey agencies; space agencies and satellite service providers; the UN system and the ISDR framework. Internationally, some data is maintained by the Centre for Research on the Epidemiology of Disasters (CRED) in Brussels.

(c) **Data References:** The Centre serves as a reference source for most applications. CRED compiles and validates data from diverse sources.

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the Secretariat for the International Strategy for Disaster Reduction (ISDR), United Nations, Geneva.

(b) **Other Contributing Organizations:** The Centre for Research on the Epidemiology of Disasters, Faculty of Medicine, University of Louvain, Belgium. The following organizations were consulted over the development and subsequent review of this indicator methodology sheet: World Food Programme, United Nations Environment Programme, Pan American Health Organization, International Federation of the Red Cross and Red Crescent Societies, and US Agency for International Development, ICSU – International Council of Scientific Unions, Munich Reinsurance Company.

6. REFERENCES

(a) **Readings:**

CRED. *Profiles in the World: Summary of Disaster Statistics by Continent*. CRED Statistical Bulletin, May 1994.

International Federation of Red Cross and Red Crescent Societies, Centre for Research on the Epidemiology of Disasters. *World Disasters Reports for 1993, 1994, and 1995.* Martinus Neijhoof Publishers, Dordrecht, Netherlands. 1993, 1994, and 1995.

Sapir, D.G. *Natural and Man-made Disasters: the Vulnerability of Women-headed Households and Children without Families.* World Health Statistical Quarterly; 46: 227-233, 1993.

CRED. *Proposed Principles and Guidelines for the Collection and Dissemination of Disaster Related Data.* Report on the IERRIS Workshop, 7-9 September 1992.

Sapir, D.G. & Sato, T. *The Human Impact of Floods: Common Issues for Preparedness and Prevention in Selected Asia-Pacific Countries.* Paper presented at the Second Asian Pacific Conference on Disaster Medicine, Chiba, Japan. 1992.

Sapir, D.G. and Misson, C. *The Development of a Database on Disasters.* Disasters; 16(1): 80-86. 1992.

CRED. *Statistical Update from CRED Disaster Events Database in: CRED Disasters in the World.* November 1991.

UNDP. *Reducing Disaster Risk, A challenge for development.* UNDP, 2004.

ISDR/UNDP, *Vision of Risk, A Review of International Indicators of Disaster Risk and its Management, A report for the ISDR inter-Agency Task force on Disaster Reduction, Working Group 3: Risk, vulnerability and Disaster Impact Assessment,* Geneva, December 2004. (http://www.undp.org/bcpr/disred/documents/publications/visionsofrisk.pdf#search='Hotspots%20indexing%20project');

ISDR, *Living with Risk, a global review of disaster reduction initiatives,* UN Geneva 2004.

International Bank for Reconstruction and Development/The World Bank and Columbia University, *Natural Disaster, Hotspots: A Global Risk Analysis Dilley, M., Chen, R.S., Deichmann, U., Lerner-Lam, A.L. and Arnold, M. with Agwe, J. Buys, P., Kjekstad, O., Lyon, B. and Yetman, G.,* Washington, D.C 2005.

(b) **Internet sites:**

www.unisdr.org

www.munichre.com

www.geohaz.org/radius

www.idea.unalmzl.edu.co/

www.proventionconsortium.org/

www.ldeo.columbia.edu/chrr/research/hotspots/

www.undp.org/bcpr

PERCENTAGE OF POPULATION LIVING IN DISASTER PRONE AREAS *(Possible new indicator)*		
Institutional	**Institutional Capacity**	**VULNERABILITY TO NATURAL HAZARDS**

1. INDICATOR

(a) Name – PERCENTAGE OF POPULATION LIVING IN DISASTER PRONE AREAS

(b) Brief Definition – The percentage of national population living in areas subject to significant risk of prominent hazards: cyclones, drought, floods, earthquake, volcanoes and landslides. The indicator will provide the percentage, per country, of people living in a zone that has a high probability of being affected by cyclones, drought, floods, earthquake, volcanoes and landslides and for each given hazard. The risk of death in a disaster caused by natural hazards is a function of physical exposure to a hazardous event and vulnerability to the hazard. People are more or less vulnerable to a given hazard depending on depends on a range of social, economic, cultural, political and physical variable.

(c) Unit of Measurement - % of national population

(d) Placement in the CSD Indicator Set – (replaces indicator of human and social losses due to natural hazards).

2. POLICY RELEVANCE

Purpose – To calculate the % of population living in disaster prone areas, thus providing a useful estimate of national vulnerability to cyclones, drought, floods, earthquake, volcanoes and landslides, which combines almost the totality of human and economic loss due to disasters caused by vulnerability to natural hazards. This indicator will contribute to a better understanding of the level of vulnerability in a given country, thus encouraging long-term, sustainable risk reduction programs to prevent disasters, which are a major threat to national development.

Relevance to Sustainable/ Unsustainable Development (theme/sub-theme) –

The general increase in vulnerability of societies worldwide has caused the social, economic and environmental impact of to natural disasters to become far greater now than ever before. In fact, the overall number of people affected by disasters has been growing by 6 % each year since 1960. This trend is expected to continue primarily because of increased concentration of people and values in the areas exposed to natural hazards.

There is a recognized high degree of interdependency between sustainable development and vulnerability to natural hazards. High vulnerability means higher exposure to natural catastrophes in the absence of disaster reduction measures. Disasters caused by vulnerability to natural hazards have a strong negative impact on the development process in both industrialized and developing countries. Therefore, the degree of vulnerability to a given natural hazard provides a key measure of social welfare and development in a given country, as well as an indication of the risk (probability) of natural disasters.

International Conventions and Agreements - Based on the experience of the International Decade for Natural Disaster Reduction, the UN General Assembly adopted resolution A/54/219 which established a permanent mandate for the UN system in the field of disaster reduction, in the framework of the global programme named International Strategy for Disaster Reduction (ISDR).

(d) International Targets/ Recommended Standards – For seismic hazard, Richter Scale and Modified Mercalli scale (easily compatible) recommended.

(e) Linkages to Other Indicators - Disaster Preparedness and Response (when developed and included in core set); Sub-theme 1: % Population Living Below Poverty Line; Sub-theme 17: Floor Area Per Person; Sub-theme 19: Population Growth Rate; 20: Population of Urban Formal and Informal Settlements; Sub-theme 30: Area of Urban Formal and Informal Settlements 54: National Sustainable Development Strategy;

3. METHODOLOGICAL DESCRIPTION

(a) Underlying Definitions and Concepts: The percentage of population living in seismic risk zones will be obtained by combing population density maps with seismic hazard maps. A large scale earthquake will affect a country through damage to buildings, fires and damage to lifelines, such as railroads, highways, bridges and water, sewage, electric power and gas networks. The most suitable way to express the level of seismic risk is through zonations (very high, high, medium, and low). Population living in “very high” and “high” zones are considered to be at risk.

The percentage of population living in flood prone areas will be obtained by combining the area affected by the 100 year return period flood with population density data.

(b) Measurement Methods: comparison of population maps to earthquake zonation maps, inventory of elements at risk (population). The earthquake zonation maps will be based on historical data providing information on the level of damage encountered in each area (very high, high, medium, low).

Historical flood data, mapping flood-prone areas by satellite remote sensing method, population density data.

(c) Limitations of the Indicator: The vulnerability data is a bundle of social, economic and environmental indicators it requires a statistical analysis of variables selected through expert opinion, were available, as global datasets and analyzed for each hazard type. For seismic risk, historical data will have to be adapted to areas where a) earthquakes have not occurred in the recent past, b) were recent development may modify the level of damage (new buildings and lifelines in areas previously not occupied).
For flood risk, Historical data will have to be adapted to areas where recent development may affect the areas likely to be flooded (upstream and downstream). Additional information can be obtained through remote sensing.

(d) Status of the Methodology: This methodology is being used by a the Disaster Risk indexing project of the UNDP in partnership with UNEP-GRID; the Hotspots indexing project implemented by Columbia University and the World Bank, under the umbrella of the ProVention Consortium and the Americas programme of IDEA in partnership with the InternAmerica Developing Bank. These projects are based on a conceptual framework that includes particular understanding of the factors contributing to human

vulnerability and disaster risk. The methodology for seismic risk assessment is widely used through the scientific community, in particular in RADIUS (Risk Assessment Tools for Diagnosis of Urban Areas Against Seismic Disasters), a tool developed to assess earthquake risk in urban areas worldwide.

4. ASSESSMENT OF DATA

(a) Data Needed to Compile the Indicator – Cyclone prone areas; drought risk map, floods risk map, earthquake risk maps, volcanoes and landslides risk maps (see above); population distribution maps; flood hazard (floodplain) maps; population distribution maps.

(b) National and International Data Availability and Sources – Data above is normally available within each country or easily obtainable; other sources are international scientific associations; insurance companies (Munich Re, Swiss Re), national geological survey agencies; space agencies and satellite service providers; the UN system and the ISDR framework.

(c) Data References

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) Lead Agency : The lead agency is the Secretariat for the International Strategy for Disaster Reduction (ISDR), United Nations, Geneva

(b) Other Contributing Organizations UNDP, UNEP-GRIP, World Bank (ProVention Consortium), Inter American Development Bank, **:** ICSU – International Council of Scientific Unions, WMO, Munich Reinsurance.

6. REFERENCES

(a) Readings: see Internet sites below for bibliography.

CRED. Statistical Update from CRED Disaster Events Database in: CRED Disasters in the World. November 1991.

UNDP. *Reducing Disaster Risk, A challenge for development*. UNDP, 2004.

ISDR / UNDP, *Vision of Risk, A Review of International Indicators of Disaster Risk and its Management, A report for the ISDR inter-Agency Task force on Disaster Reduction, Working Group 3: Risk, vulnerability and Disaster Impact Assessment*, Geneva, December 2004.
(http: / / www.undp.org / bcpr / disred / documents / publications / visionsofrisk.pdf#search='Hotspots %20indexing%20project');

ISDR, *Living with Risk, a global review of disaster reduction initiatives,* UN Geneva 2004.

International Bank for Reconstruction and Development / The World Bank and Columbia University, *Natural Disaster, Hotspots: A Global Risk Analysis Dilley, M., Chen, R.S., Deichmann, U., Lerner-Lam, A.L. and Arnold, M. with Agwe, J. Buys, P., Kjekstad, O., Lyon, B. and Yetman, G.,* Washington, D.C 2005.

IBD, *Indicators of Disaster Risk and Risk Management, Inter-American Development Bank,* Washington, D.C.
(b) Internet sites: www.unisdr.org , www.munichre.com**,** www.ldeo.columbia.edu/chrr/research/hotspots, www.proventionconsortium.org/, www.idea.unalmzl.edu.co/, http://www.undp.org/bcpr/disred/documents/publications/visionsofrisk.pdf#search='Hotspots%20indexing%20project';