

Updated technical non-paper on indicators for global targets A, B, C, D, E and G of the Sendai Framework for Disaster Risk Reduction

30 September 2016

The United Nations Office for Disaster Risk Reduction

Consolidated list of possible indicators for global targets A-E and G of the Sendai Framework

This document presents the recommendations of, and summarises the technical issues identified by the Secretariat in respect of the indicators to measure progress in achieving global targets A-E and G of the Sendai Framework for Disaster Risk Reduction.

The indicators recommended for retention are based on the Working Text on Indicators¹, as well as the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction of the 10 June 2016. The technical rationale for the recommendations of the Secretariat is contained in the Concept Notes, and employs the categorisation approach adopted by the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs).

On the basis of this categorisation, and other technical considerations, the Secretariat suggests which of the proposed indicators are '**Recommended for measurement of the global targets**'. The table below consolidates the possible indicators that are listed in the updated Concept Notes that follow.

	Target A
A-1	Number of deaths and missing persons / presumed dead due to hazardous events per 100,000.
A-2	Number of deaths due to hazardous events.
A-3	Number of missing persons / presumed dead due to hazardous events.
	Target B
B-1	Number of affected people by hazardous events 100,000.
B-2 or B-2. alt	Number of injured or ill people due to hazardous events Number of people suffering from physical injuries, trauma or cases of disease requiring immediate medical assistance as a direct result of a hazardous events.
B-3a	Number of evacuated people due to hazardous events
B-3b	Number of relocated people due to hazardous events.
B-4	Number of people whose houses were damaged due to hazardous events.
B-5	Number of people whose houses were destroyed due to hazardous events.
B-6	Number of people who received aid including food and non-food aid due to hazardous events.
B-7	Number of people whose livelihoods were disrupted, destroyed or lost due to hazardous events.

¹ based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016

	Target C
C-1	Direct economic loss due to hazardous events in relation to global gross domestic product.
C-2	Direct agricultural loss due to hazardous events.
C-3	Direct economic loss due to industrial facilities damaged or destroyed by hazardous events
C-4	Direct economic loss due to commercial facilities damaged or destroyed by hazardous events.
C-5	Direct economic loss due to houses damaged by hazardous events
C-5b	Damage and loss of administrative buildings.
C-6	Direct economic loss due to houses destroyed by hazardous events
C-7	Direct economic loss due to damage to critical infrastructure caused by hazardous events.
C-8	Direct economic loss due to cultural heritage damaged or destroyed by hazardous events.
C-9	Direct economic loss due to environment degraded by hazardous events.
C-10	Total insured direct losses due to hazardous events
	Target D
D-1	Damage to critical infrastructure due to hazardous events.
D-2	Number of health facilities destroyed or damaged by hazardous events.
D-3	Number of educational facilities destroyed or damaged by hazardous events.
D-4	Number of transportation units and infrastructures destroyed or damaged by hazardous events.
D-4b	Kilometres of road destroyed or damaged per hazardous event.
D-4c	Number of bridges destroyed/damaged by hazardous event.
D-4d	Kilometres of railway destroyed / damaged by hazardous event.
D-4k	Number of airports destroyed / damaged by hazardous event
D-4l	Number of ports destroyed / damaged by hazardous event
D-1 bis	Number of electricity plants / transmission lines destroyed or damaged by hazardous events.
D-5	Number of times basic services have been disrupted due to hazardous events.
	Target E
E-1	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030
E-2	Percentage of local governments that adopt and implement local DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

	Target G
G-1	Number of countries that have multi-hazard early warning system.
G-2	Number of countries that have multi-hazard monitoring and forecasting system.
G-3	Number of people who are covered by and have access to multi-hazard early warning system per 100,000
G-4	Number of local governments having a preparedness plan (including EWS) or evacuation plan with standard operating procedures.
G-5	Number of countries that have multi-hazard national risk assessment / information, with results in an accessible, understandable and usable format for stakeholders and people.
G-6	Number of local governments that have multi-hazard risk assessment / risk information, with results in an accessible, understandable and usable format for stakeholders and people.

Compound indicator

Summary of Concept Notes on Indicators for global targets A, B, C, D, E and G of the Sendai Framework

1. Purpose

The purpose of this document is to support the deliberations of Member States in the selection and design of the indicators to monitor progress and achievement of the global Targets of the Sendai Framework for Disaster Risk Reduction 2015-2030, and summarises the recommendations of the Secretariat with regards to the indicators to measure the global Targets, as well as key technical suggestions and considerations.

This document has been produced by the UN Office of Disaster Risk Reduction and responds to the request for additional information in respect of the indicators for Targets A, B, C, D, E and G by Members of the Open-ended Intergovernmental Expert Working Group on Indicators and Terminology Relating to Disaster Risk Reduction (OEIWG) in its Second Session in Geneva on the 10 and 11 February, 2016.

2. Background

This non-paper is based on *the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction* issued on 10 June 2016. Unless stated otherwise, key terms used in this non-paper are those defined in the document *Terminology related to Disaster Risk Reduction - updated technical non-paper* issued on 30 September 2016 or are the *working definitions* identified in the *Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction* issued on 10 June 2016; both are developed on the basis of the *Working Text on Terminology* based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016.

The Open-ended Intergovernmental Expert Working Group on Indicators and Terminology Related to Disaster Risk Reduction (OEIWG) requested the Secretariat to propose methodologies and provide technical inputs at the First and Second Sessions, held in Geneva on 29-30 September 2015 and 10-11 February 2016.

This non-paper builds on, and should be read in concert with the previous technical submissions made by the Secretariat². These include but are not restricted to:

- Concept note on Methodology to Estimate Direct Economic Losses from Hazardous Events to Measure the Achievement of Target C
- Concept Note on Methodology to Estimate progress of National and Local DRR Strategy to Measure the Achievement of Target E
- Information Note on Comments received on the Working Background Text on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction
- Background Paper - Indicators to Monitor Global Targets of the Sendai Framework for Disaster Risk Reduction 2015-2030: A Technical Review

² <http://www.preventionweb.net/drr-framework/open-ended-working-group/technical-papers>

The recommendations for indicators contained in this document employ the categorisation approach introduced in the Technical Collection of Concept Notes on Indicators³ which is itself consistent with the approach employed by the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) to analyse the proposed indicators by a) the level of methodological development, and b) overall data availability.

On the basis of this categorisation, and other technical considerations, the Secretariat suggests which of the proposed indicators are '**Recommended for measurement of the global targets**'.

This document is informed by, and in turn informs, the deliberations of the Inter-agency Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs), and the UN Statistical Commission (UNSC) on the global monitoring framework for the 2030 Agenda for Sustainable Development.

3. Common Issues

A number of issues common to a number of the Targets have been identified.

3.1 Temporal Dimension:

For Targets A through D, the temporal dimension should be defined so as to establish when data should be recorded and reported. The dynamics of disasters can force changes in the data (e.g. persons injured can pass away after a certain period of time). Defining this issue is critical, especially when recording losses associated with slow-onset disasters, such as drought.

Therefore, given the propensity for variation after disaster, data for the proposed indicators should be recorded only when **data are stable and appropriately representative**, after the end of sudden-onset disasters (such as earthquakes or floods). **42 days is recommended.**⁴ This would be the period within which a legal determination of persons missing or presumed dead is recorded after an event. A period of 42 days is considered sufficient to allow authorities to establish stable and appropriately representative figures and therefore is expected to capture the majority of the reports.

The UNISDR / DesInventar methodology⁵ suggests practical methods for the establishment of a **start and end date** of *slow-onset disasters* such as droughts. It is suggested that the date of appearance of first reports of damage can mark the beginning of the disaster (not the actual phenomena, e.g. drought or similar slow onset event) and the date of the last report of physical damage associated with the event can be taken as the end date of the event.

The same methodology also recommends **annual reporting** as a minimum for slow-onset disasters that span more than one year, thereby facilitating the reporting of multi-annual events – most of which are associated with climatic phenomena and climate change induced processes.

³ Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction (UNISDR, 10 June 2016)

⁴ This recommendation is consistent with medical research in maternal mortality at birth (see <http://www.maternalmortalitydata.org/Definitions.html>). 42 days would be the period within which all people for which a legal determination of being missing or presumed dead is recorded after an event – this is expected to capture the majority of the reports. The experience gained in the aftermath of disasters suggest that this period may be sufficient to allow authorities to establish stable and appropriately representative figures.

⁵ www.desinventar.net

Not every country has a comparable national disaster loss database that is consistent with these guidelines (although current coverage exceeds 89 countries). Therefore, by 2020, it is expected that all countries will build/adjust national disaster loss databases according to the recommendations and guidelines of the OEIWG.

3.2 Disaggregation:

Both the OEIWG and the IAEG-SDGs are deliberating on disaggregation of data by agreed criteria in determining the indicators to measure respective targets. Paragraph 26 of the Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators⁶ of the 19 February 2016, recommends that 'indicators should cover the specific groups of the population and other disaggregation elements as specified in the targets...[and] agreed on an overarching principle of data disaggregation to accompany the list of indicators, as follows:

Sustainable Development Goal indicators should be disaggregated, *where relevant*, by **income, sex, age, race, ethnicity, migratory status, disability and geographic location**, or other characteristics, in accordance with the Fundamental Principles of Official Statistics⁷.

To address this issue, the IAEG-SDGs has established a dedicated Working Group on Data Disaggregation, the next meeting of which will take place at the forthcoming 4th Meeting of the IAEG-SDGs in Addis Ababa on 18-21 October 2016 where Member States will discuss the Work Plan on Data Disaggregation and examine strategies and best practices for increasing the levels of disaggregation for SDG indicators.

The experience of countries and entities of the UN system in building disaster loss databases has demonstrated that applying the principle of data disaggregation is no simple endeavour. Systematic collection of data disaggregated by sex and age for example, has been undertaken in only a few cases and with limited success. Furthermore, although Target 11.5 of SDG 11 emphasises the "*focus on protecting the poor and people in vulnerable situations*", there is little evidence that loss and damage data disaggregated by income has been collected in a systematic manner - likewise ethnicity, migratory status or disability.

Unlike the targets of the SDGs, the Targets of the Sendai Framework do not define specific requirements for disaggregation, however such information is necessary. The Secretariat therefore recommends the following:

- Disaggregated data should be collected by Member States at National Level.
- The criteria to disaggregate information should be developed by Member States in a manner such that a compromise is found between the commitment to ensure that "no one is left behind"⁷, and the burden that such additional reporting requirements entails – be it in terms of cost, feasibility, or sustainability.
- Members of the Working Group may wish to defer to the recommendations of the Working Group on Data Disaggregation of the IAEG-SDGs.
- The OEIWG may wish to develop recommendations to countries to guide the disaggregation of loss and damage data that may contribute to, and be informed by the recommendations of the Working Group on Data Disaggregation.

⁶ E/CN.3/2016/2/Rev.1*

⁷ Resolution 70/1, para. 48

The Secretariat recommends that in collecting data, countries enforce the overarching principle of data disaggregation by collecting data associated with simple but relevant and collectively exhaustive groups; this is of particular importance when measuring the indicators for Targets A to D.

The following characteristics of disaggregation can be applied to a number of the Targets of the Sendai Framework:

	Sendai Framework Targets
Country	A-G
Hazardous event	A, B, C, D,
Hazard*	A, B, C, D, G
Aggregation of "location of residence"***	A, B, C, D,

* for example using the IRDR classification, natural hazards can be disaggregated by specific hazard type, and by family or group, e.g. climatological, hydrological, meteorological, geophysical, biological and extra-terrestrial

** ideally by sub-national administrative unit, similar to municipality. This is referred to as **geographic location** in the discussions of the IAEG-SDGs.

The Secretariat also makes recommendations as to the minimum requirements for disaggregation that are specific to Targets considering human losses (Targets A and B).

Targets A and B - human losses (mortality and affected):

- Poverty: international poverty line*
- Sex: women, men
- Age: children, adults, older people**
- Disability: people with disabilities / people without disabilities
- Geographic location: determined by the administrative unit equivalent to Municipality

* In October 2015, the World Bank updated the international poverty line to **US\$1.90 a day** (using 2011 prices)⁸.

** The Secretariat proposes the following classification for age disaggregation based on review of international practice:

- Children – 0 to 14 years
- Adults – 15 to 64 years
- Older People – 65+ years.

Additional recommendations for disaggregation that are specific to individual Targets are contained in respective sections of the non-paper.

⁸ See <http://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq>

Disaggregation in the SDGs

In determining the degree of data disaggregation, the OEIWG may wish to consider the characteristics of disaggregation that are being discussed in the context of the IAEG-SDGs. These include the following:

Income:

The IAEG-SDGs is discussing disaggregation by characteristics including: social protection for work; international poverty line; people who receive unemployment benefits; coverage of social protection and labour programmes; households ranked in quintiles of the welfare distribution; prevalence of under-nourishment; debt service as the proportion of exports of goods and services; growth rates of household expenditure or income per capita among the bottom 40% of the population and the total population; net ODA to least developed countries.

The Secretariat recommends the use of the international poverty line.

Sex:

The IAEG-SDGs is discussing disaggregation by characteristics including: pregnant; married under-age; having experienced female genital mutilation; proportion of women in managerial positions; proportion of countries with guaranteed equal rights to land ownership for women; persons owning a mobile phone; unemployment rate; employed women covered by maternity benefits; convenient access to transport; and proportion of young women and men (below the age of 18 years) having experienced sexual violence.

The Secretariat recommends disaggregation by women / men.

Age:

In respect of Age, no common international standard exists. As identified by UN DESA⁹, and as evidenced by the variety of existing national and international practices, many different age classifications are in use; for instance group size (number of years - grouped together), group boundaries (ages defining a group) and age range (lowest and highest age). In considering existing national and international practices, DESA identified common elements¹⁰ including the widespread use of five- and ten-year age groups, with the boundaries generally beginning at multiples of five and ten and ending at four and nine.

The IAEG-SDGs is discussing disaggregation by characteristics including: neonatal; infant; child; adolescent; youth; adults; older persons.

The Secretariat recommends disaggregation by children, adults and older people.

⁹ PROVISIONAL GUIDELINES ON STANDARD INTERNATIONAL AGE CLASSIFICATIONS. Department of International Economic and Social Affairs - Statistical Office - STATISTICAL PAPERS Series M No.74. (ST/ESA/STAT/SEA.M/74)

¹⁰ idem

Race, Ethnicity and Migratory Status:

The Secretariat suggests that these categories, which are being discussed in the context of the IAEG-SDGs, are not directly relevant for measurement of the global Targets of the Sendai Framework. Member States may wish to consider measuring these categories aligned to the national context.

Disability:

The IAEG-SDGs is discussing disaggregation by characteristics including those identified in the UN Convention on the Rights of Persons with Disabilities, for instance: long-term physical, mental, intellectual or sensory impairments which, in interaction with various attitudinal and environmental barriers, hinders their full and effective participation in society on an equal basis with others.

Given the wide spectrum of disabilities, coupled with the practical implications for data collection and reporting, the Secretariat suggests that only one classification of disability be used that would encompass all aspects of disability.

The Secretariat therefore proposes the category – **People with disabilities**.

Member States may wish to draw from the discussions of the IAEG-SDGs in determining the definition of people with disabilities.

Target A: updated concept note on methodology

1. Overview

Target A: *Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015*

This Non-paper is based on the Concept Note that was developed by the Secretariat at the request of Member States. The Concept Note is based on previous experience of a number of governments, academic and research institutions, private organizations and work of the United Nations in more than 89 countries supporting the building of Disaster Loss Databases.

The methodology outlined in the Concept Note proposes the collection and use of **simple and uniform physical indicators of mortality (number of people)** as the point of departure for computation.

2. Context

Analysis of studies and the experiences of the large number of data providers have shown that disaster mortality has been assessed and reported by different actors using slightly different but similar approaches. Unlike other loss indicators, such as economic loss, the degree of coherence and consistency of the figures provided by all sources are high.

Variations in approach result in relatively minor inconsistencies in global disaster mortality data that are currently reported by both national and international data providers. However, where these estimates exist, it is possible to identify which elements of mortality were taken into account.

The elements and reporting thresholds used by Member States can differ, but in general the methodology and definitions employed remain consistent over time. The Global Assessment Report on Disaster Risk Reduction (GAR) 2015 showed that differences in reported mortality were, in the worst cases, less than 15%, and that the majority of variations in mortality were usually a function of differences in the reporting thresholds of some databases.

Another source of variation also occurs due to the fact that some disaster loss databases do not take into account Missing / Presumed dead, and only count certified deaths (as is the case of EMDAT).

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016..

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
A-1	Number of deaths and missing persons / presumed dead due to hazardous events per 100,000.	Y	Y
A-2	Number of deaths due to hazardous events.	Y	Y
A-3	Number of missing persons / presumed dead due to hazardous events.	Y	Y

Summary of Computing Methodology:

Indicator A-1 is a compound indicator, calculated as the simple sum of Indicators A-2 and A-3.

4. Applicable Working Definitions

Target A of the Sendai Framework specifically requires “global disaster mortality” to be estimated. For the purposes of this methodology, unless stated otherwise key terms are the working definitions identified in the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction of the 10 June 2016, which was informed by the “Working Text on Terminology” based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016.

Working Definition:

Deaths: The number of people who died during the disaster, or directly after, as a direct result of the hazardous event

Missing: The number of people whose whereabouts is unknown since the hazardous event. It includes people who are presumed dead although there is no physical evidence.

Presumed dead: The number of people believed to be dead, for whom there is no physical evidence such as a body, and for which an official/legal report has been filed with competent authorities.

Note from the Secretariat: *The data on number of deaths and number of missing/presumed dead are mutually exclusive.*

Note from the Secretariat: *In both definitions of "Missing" and "Presumed dead" the Secretariat suggests that the data for both categories is contingent upon the existence of legal reports or*

declarations. Such reports or declarations will ultimately result in those persons being legally declared dead ("declared death in absentia" or legal presumption of death) despite the absence of direct proof of the person's death, such as the identification of physical remains (e.g. a corpse or skeleton) attributable to that person. As a result, the indicator would use only official data, and not be dependent upon unofficial sources – such as mainstream media or humanitarian situation reports.

5. Critical issues, sources, data collection and statistical processing:

Source and data collection

National disaster loss databases.

The Secretariat recommends that reporting against these indicators is undertaken using information collected in National disaster loss databases.

Data of "Missing/Presumed dead" is not consistently collected in all countries. For many countries, the separation of data on "Missing/Presumed dead" from "Deaths/Deceased", or the collection of data on "Missing/Presumed dead", will be required to be able to report against recommended Indicators A-2 and A-3.

Statistical processing

Disaster loss data on mortality is significantly influenced by large-scale catastrophic events, which represent important outliers in terms of mortality, as they can imply considerable numbers of people killed (as was the case in the Haiti earthquake in 2010, the Great East Japan Earthquake in 2011, and in several countries after the Indian Ocean Tsunami in 2004).

UNISDR recommends countries report the data by hazardous event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (outliers) can be included or excluded.

Target B: updated concept note on methodology

1. Overview

Target B: Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015

This Non-paper is based on the Concept Note that was developed by the Secretariat at the request of Member States. The Concept Note is based on previous experience of a number of governments, academic and research institutions, private organizations and work of the United Nations in more than 89 countries supporting the building of Disaster Loss Databases.

The methodology outlined in the Concept Note proposes the collection and use of **simple and uniform physical indicators of affected (number of people)** as the point of departure for computation.

2. Context

The elements of 'affected' are numerous and complex. People can be affected in many ways and to different degrees: from the loss or destruction of their primary residence, to the inconvenience of being unable to use household appliances as a result of an interruption in the electricity supply. People can be affected at great distance from the disaster site, crossing borders, even continents, or be affected during the onset of a disaster and/or long after the disaster.

The document "Terminology for Disaster Risk Reduction: Technical working draft for the Chair" (September 2016) suggests that "People [...] are affected, either directly or indirectly, by a hazardous event. Directly affected are those who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets. Indirectly affected are people who have suffered consequences, other than or in addition to direct effects, over time due to disruption or changes in economy, critical infrastructures, basic services, commerce, work or social, health and psychological consequences.."

Given the large number of variables that can be considered in 'Affected', it is important to emphasize that no indicator will provide an absolutely precise, accurate and exhaustive measure of affected. Even estimations of directly affected can be subjective, dependent on the methodology and criteria used, as well as the exhaustiveness of data collection.

Taking into account the difficulties of assessing the full range of all affected (directly and indirectly), UNISDR proposes the use of an indicator that would estimate "**directly affected**" as a proxy for the number of affected. This indicator, while not perfect, uses widely available data and could be used consistently across countries and over time to measure the achievement of the Target B.

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016..

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
B-1	Number of affected people by hazardous events 100,000. [Compound indicator]	Y	Y
B-2 or B-2. alt	Number of injured or ill people due to hazardous events Number of people suffering from physical injuries, trauma or cases of disease requiring immediate medical assistance as a direct result of a hazardous events.	Y	Y
B-3a	Number of evacuated people due to hazardous events	Y	Y
B-3b	Number of relocated people due to hazardous events.	Y	Y
B-4	Number of people whose houses were damaged due to hazardous events.	Y	Y
B-5	Number of people whose houses were destroyed due to hazardous events.	Y	Y
B-6	Number of people who received aid including food and non-food aid due to hazardous events.	N	Y
B-7	Number of people whose livelihoods were disrupted, destroyed or lost due to hazardous events.	Y	Y

Summary of Computing Methodology:

From the perspective of data availability, feasibility of collection and measurability, the Secretariat has proposed the use of a compound indicator B-1 based on:

- **B-2 Number of people Injured or ill as a direct result of a hazardous event**
- **B-3a Number of evacuated people due to hazardous events**
- **B-3b Number of relocated people due to hazardous events**

and to measure the number who suffered **direct damage to their livelihoods or assets**

- **B-4, B-5 People whose houses were damaged or destroyed**
- **B-6 People who received food relief aid.**
- **B-7 People who work in or own industries and commercial facilities affected (B-7)**
- **People who work on or own agricultural crops and livestock affected or lost**

B-1 will be calculated as the simple sum of B-2 to B7.

B-2, B-3a, B-3b and B-6 indicators would be directly collected for each hazardous event.

B-4 and **B-5** will be calculated multiplying the number of houses damaged or destroyed by the national average of persons per household in the country. Data on the number of houses damaged or destroyed is already collected under Target C.

Similarly, **B-7** will be calculated using the number of people associated with the asset affected. For industries and commercial facilities it will be the average number of people that work on those facilities and for agricultural crops and livestock lost it would be the average number of workers per hectare or livestock in the country. Data on the number of industrial facilities damaged or destroyed and agricultural crops and livestock lost is already collected under Target C.

The Secretariat makes recommendations for the data to be collected and reported for Target C (see Section 5 below).

4. Applicable Working Definitions and Terminology

Target B of the Sendai Framework specifically requires “the number of affected people” to be estimated. For the purposes of this methodology, unless stated otherwise key terms are those defined in the document “Terminology for Disaster Risk Reduction: Technical working draft for the Chair” (September 2016) or are the working definitions identified in the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction of the 10 June 2016, both of which are developed on the basis of the “Working Text on Terminology” based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016

Terminology:

Affected: People who are affected, either directly or indirectly, by a hazardous event. Directly affected are those who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets. Indirectly affected are people who have suffered consequences, other than or in addition to direct effects, over time due to disruption or changes in economy, critical infrastructures, basic services, commerce, work or social, health and psychological consequences.

Working Definition:

Evacuated: The number of people who temporarily moved from where they were (including their places of residence, work places, schools, and hospitals) to safer locations in order to ensure their safety.

Houses damaged: Houses (housing units) with minor damage, not structural or architectural, which may continue to be habitable, although they may require some repair or cleaning.

Houses destroyed: Houses (housing units) levelled, buried, collapsed, washed away or damaged to the extent that they are no longer habitable.

Injured or ill: The number of people suffering from physical injuries, trauma or cases of disease requiring immediate medical assistance as a direct result of a hazardous event.

Livelihood: Means, capabilities, tangible and intangible assets, including human, social, natural, physical, financial resources, that people draw upon to make a living.

People who received food relief aid: The number of persons who received food /nutrition, by government or as humanitarian aid, during or in the aftermath of a hazardous event.

People whose houses were damaged or destroyed due to hazardous events: The estimated number of inhabitants previously living in the houses (housing units) damaged or destroyed. All the inhabitants of these houses (housing units) are assumed to be affected being in their dwelling or by direct consequence of the destruction/damage to their housings (housing units). An average number of inhabitants per house (housing unit) in the country can be used to estimate the value.

Productive assets*: Assets with both direct and indirect values, which can be used to generate a value-added

Relocated: The number of people who moved permanently from their homes to new sites due to a hazardous event.

5. Critical issues, sources, data collection and statistical processing:

Source and data collection

National disaster loss databases.

The Secretariat recommends that reporting against these indicators is undertaken using information collected in National disaster loss databases.

The following table summarizes the recommendations of the Secretariat for **data to be collected and reported for measuring the global target:**

No.	Indicator	Methodology	Data
B-2 or B-2. alt	Number of injured or ill people due to hazardous events Number of people suffering from physical injuries, trauma or cases of disease requiring immediate medical assistance as a direct result of a hazardous event.	Y	Y
B-3a	Number of evacuated people due to hazardous events	Y	Y
B-3b	Number of relocated people due to hazardous events.	Y	Y
B-6	Number of people who received aid including food and non-food aid due to hazardous events.	N	Y

It is important to note that Indicators B-4, B-5 and B-7 would not require additional data collection as the data for these indicators will be collected for indicators of Target C. See the Concept Note for

Target C and the indicators related to losses in the housing, agricultural, industrial and commercial sectors.

Statistical processing:

Disaster loss data is greatly influenced by large-scale catastrophic events, which represent important outliers in terms of affected people. UNISDR recommends countries report the data by hazardous event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (outliers) can be included or excluded.

Exclusion of Mortality:

The Secretariat recommends that mortality figures are not counted in this category.

Double-counting:

In reality, double counting of affected people is unavoidable in many countries (for example, injured and evacuated). However, by using the recommended methodology and indicators, countries will have a robust and verifiable proxy of total number of affected that is suitable for measuring the achievement of the target.

Target C: updated concept note on methodology

1. Overview

Target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030

This Non-paper is based on the Concept Note that was developed by the Secretariat at the request of Member States. The methodology described in the Concept Note is based on the work published in the UN Global Assessment Report on Disaster Risk Reduction (GAR). It is a simplified and adapted version of the UN Economic Commission for Latin America and the Caribbean methodology for disaster assessment (UN-ECLAC, 2014) and is built on continuing work with scientific partners including those that developed UNISDR's probabilistic global risk model. The methodology has been tested with datasets of 56 and 82 countries, found in the 2013 and 2015 GARs, using 350,000 reports of small, medium and large-scale disasters.

A lack of uniformity in approaches to conducting disaster loss economic assessments and reporting has produced inconsistencies in economic losses currently reported by both national and international data sources. Where estimates are available, it can be difficult to determine which methodology, criteria and parameters have been used for estimation, and thus which elements of loss have been considered.

The methodology proposed here will allow assigning a **consistent, conservative and homogeneously** estimated economic value to **physical losses** in hundreds of thousands of disasters at all scales expected to be reported as part of the Sendai Framework Targets monitoring process.

This methodology proposes, whenever possible, the collection and use of **simple and uniform physical indicators of damage (counts of assets affected)** as the starting point for calculations, instead of requesting countries to directly evaluate the economic value of direct losses.

The economic evaluation methodology is presented for each of the Indicators proposed. Each section contains a brief explanation of the three steps (data collection, conversion of physical value into economic value, and conversion from national currency into US dollars) while identifying challenges and suggesting options for countries to consider how to address them.

2. Context

The sources of data used in this methodology to estimate direct economic loss are national disaster loss databases. These usually contain a large number of records of hazardous events at all scales, and include quantitative and qualitative indicators of physical damage. From the experience of working with 89 countries developing disaster loss databases, it can be concluded that simple physical damage indicators are in general robust, more practical and easier to obtain and collect.

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016..

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
C-1	Direct economic loss due to hazardous events in relation to global gross domestic product.	Y	Y
C-2	Direct agricultural loss due to hazardous events.	Y	Y
C-3	Direct economic loss due to industrial facilities damaged or destroyed by hazardous events	Y	N
C-4	Direct economic loss due to commercial facilities damaged or destroyed by hazardous events.	Y	N
C-5	Direct economic loss due to houses damaged by hazardous events	Y	Y
C-5b	Damage and loss of administrative buildings.	Y	N
C-6	Direct economic loss due to houses destroyed by hazardous events	Y	Y
C-7	Direct economic loss due to damage to critical infrastructure caused by hazardous events.	Y	Y
C-8	Direct economic loss due to cultural heritage damaged or destroyed by hazardous events.	Y	N
C-9	Direct economic loss due to environment degraded by hazardous events.	Y	N
C-10	Total insured direct losses due to hazardous events	Y	Y

Summary of Computing Methodology:

Indicator C-1 is a compound indicator, calculated using Indicators C-2 to C-9. The methodology is described in the Concept Note.

Using a simple and consistent pricing methodology for indicators of losses in respect of houses, roads, agriculture, schools, commercial, industrial and health facilities, it is possible to estimate a significant part of total direct economic loss. Suggestions are also made as to economic valuations of Environmental and Cultural Heritage loss and damage.

For all of the sectors that refer to the built environment (i.e. housing, health, education, commercial, and industrial facilities) a simple methodology is proposed estimating the price of lost assets, using the cost of construction as the basis for replacement value.

The Economic Commission for Latin America and the Caribbean (ECLAC) methodology suggests that the value of the **physical damage to buildings (applicable to indicators C-3 to C-7)** can be calculated

as replacement value based on the:

- size of the building
- price per square meter of construction
- damage to furniture and equipment contained in the building (as % of the value of building)
- associated infrastructure (utility networks access roads, landscaping, as % of the value of building).

In turn, the replacement values of **equipment and associated infrastructure** are estimated as a percentage of the value of the construction; a percentage that varies between sectors. In the case of houses, for example, the equipment contained is suggested in ECLAC and other methodologies to be 25% of the replacement value of the house; this percentage is much higher in health and industrial sectors.

In case of damaged structures, where damage varies from very light to heavy damage, the **average** cost of damages is calculated as a percentage of the total replacement value of the asset. ECLAC and UNISDR/GAR methodology assessments have been using 25% as average damage ratio.

For **transportation infrastructures (D-4b in C-7)**, the methodology uses rehabilitation costs per lineal meter of roads, extracted from common projects in the sector. Average rehabilitation costs can be extracted from statistics of a relevant number of rehabilitation projects in ministries of public works or using international datasets such as the ROKS database of the World Bank.

Agricultural damage loss (indicator C-2): Losses in crops are estimated by calculations based on the output value of the number of hectares of crops (**C-2a**). The underlying principle is that direct losses (seeds, fertilizers, pesticides, labor and other direct costs that comprise what farmers invest in their crops) can be estimated as a percentage of the expected yield of crops, valued using the price to producer of the yield per hectare. In the case of livestock, the direct cost of loss of animals is assessed as the price to producer of the total number of animals lost (**C-2b**) calculated using the price per kilo of meat of livestock. Prices to producer and other agricultural statistics such as crop areas are commonly calculated and maintained by national ministries of agriculture, or can be extracted from international datasets such as those kept by FAO.

Environmental losses are proposed to be evaluated using a minimal number of indicators of physical damage recording damage data for up to 11 biomes considered by the TEEB methodology, recommending as minimum requirement the losses associated to Forests. For each biome, the Secretariat **initially proposes the use of “Raw Materials” service** as a proxy for direct economic losses, the most relevant of the 22 ecosystem services associated with these biomes in terms of loss of assets thus direct economic loss. The rest of these services are considered part of indirect losses.

Cultural Heritage economic losses are much more difficult to assess, therefore for the purpose of assigning a **direct economic loss value**, a simple division of assets lost in two groups is proposed:

- one composed of buildings, monuments and fixed infrastructure, and
- the second composed of ‘mobile’ elements such as art, historical artefacts.

The economic assessment of direct losses associated with the items will come from rehabilitation costs, and in the case of totally lost mobile assets, from its market value.

In all cases, the Secretariat is proposing, as best practice, that **all of the physical damage indicators are collected and kept by countries as these are important information assets.**

Physical damage indicators will allow the future connection of loss data with risk assessments or disaster forensics. It will make the assessment of direct losses more transparent and verifiable, and will allow, among other things, the incremental improvement of assessment; as improved methodologies are developed and better and more comprehensive baseline data are collected by countries.

Indicator C-10 serves a dual purpose. It may:

- a) provide evidence-based information about the total losses when robust physical damage indicators are absent, or be a point of verification when the data is available, and
- b) complement existing knowledge of the amount of the total direct economic loss not absorbed by private and public actors, giving some measure of resilience.

4. Applicable Working Definitions and Terminology

Target C of the Sendai Framework specifically requires “direct economic loss” to be estimated. For the purposes of this methodology, unless stated otherwise the term “*Direct economic loss*” and related key terms are those defined in the document “Terminology for Disaster Risk Reduction: Technical working draft for the Chair” (September 2016) developed on the basis of the Working Text on Terminology based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016.

Terminology:

Economic Loss:

Total economic impact that consists of direct economic loss and indirect economic loss.

Direct economic loss: the monetary value of total or partial destruction of physical assets existing in the affected area. Direct economic loss is nearly equivalent to physical damage.

Indirect economic loss: a decline in economic value added as a consequence of direct economic loss and/or human and environmental impacts.

Annotations: Example of physical assets that are the basis for calculating direct economic loss include homes, schools, hospitals, commercial and governmental buildings, transport, energy, telecommunications infrastructures and other infrastructure; business assets and industrial plants; production such as crops, livestock and production infrastructure. They may also encompass environmental assets and cultural heritage.

Direct economic loss usually happens during the event or within the first few hours after the event and is often assessed soon after the event to estimate recovery cost and claim insurance payments. These are tangible and relatively easy to measure.

Indirect economic loss includes micro-economic impacts (e.g. revenue declines owing to business interruption), meso-economic impacts (e.g. revenue declines owing to impacts on natural assets,

interruptions to supply chains or temporary unemployment) and macro-economic impacts (e.g. price increases, increases in government debt, negative impact on stock market prices, and decline in GDP). Indirect losses can occur inside or outside of the hazard area and often with a time lag. As a result they may be intangible or difficult to measure.

Working Definition:

Replacement cost: The cost of replacing damaged assets with materials of like kind and quality.

Annotations: This includes both private and public assets. Replacement is not necessarily an exact duplicate of the subject but serves the same purpose or function as the original (not taking into account building back better.

5. Critical issues, sources, data collection and statistical processing:

Source and data collection

National disaster loss databases.

The Secretariat recommends that reporting against these indicators is undertaken using information collected in National disaster loss databases.

The Secretariat recommends that countries collect and report data in the form **of physical damage indicators**, in all instances. The following table summarizes the recommendations of the Secretariat for data to be collected and reported for measuring the global target:

No.	Indicator	Methodology	Data
C-2	<p>Direct agricultural loss due to hazardous events.</p> <p>Data to be collected [Minimum Requirement]: C-2a Number of Hectares of Crops affected C-2b Number of Livestock lost</p> <p>Recommended disaggregation: C-2a: By type of crop C-2b: by type of livestock lost</p>	Y	Y
C-3	<p>Direct economic loss due to industrial facilities damaged or destroyed by hazardous events</p> <p>Data to be collected [Minimum Requirement]: C-3a: Number of industrial facilities damaged or destroyed</p> <p>Recommended disaggregation: - By type level of affectation (damaged/destroyed) - By size of Facility (small/medium/large)</p>	Y	N
C-4	<p>Direct economic loss due to commercial facilities damaged or destroyed by hazardous events.</p> <p>Data to be collected [Minimum Requirement]: C-4a: Number of commercial facilities damaged or destroyed</p> <p>Recommended disaggregation: - By type level of affectation (damaged/destroyed) - By size of Facility (small/medium/large)</p>	Y	N
C-5	<p>Direct economic loss due to houses damaged by hazardous events</p> <p>Data to be collected [Minimum Requirement]: C-5a Number of houses damaged by hazardous events</p>	Y	Y
C-6	<p>Direct economic loss due to houses destroyed by hazardous events</p> <p>Data to be collected [Minimum Requirement]: C-6a Number of houses destroyed by hazardous events</p>	Y	Y

C-5b	<p>Damage and loss on administrative buildings.</p> <p>Data to be collected [Minimum Requirement]: C-5ba Number of administrative buildings affected by hazardous events</p> <p>Recommended disaggregation:</p> <ul style="list-style-type: none"> - By type level of affectation (damaged/destroyed) - By size of Facility (small/medium/large) 	Y	N
C-7	<p>Direct economic loss due to damage to critical infrastructure caused by hazardous events.</p> <p>Data to be collected [Minimum Requirement]: D-2 Number of health facilities destroyed or damaged by hazardous events D-3 Number of educational facilities destroyed or damaged by hazardous events D-4b Number of kilometres of road destroyed or damaged per hazardous event.</p> <p>Recommended disaggregation:</p> <ul style="list-style-type: none"> - By type level of affectation (damaged/destroyed) - D-2 and D-3: By size of Facility (small/medium/large) - D-4b by type of road (unpaved, single paved, highway) 	Y	Y
C-8	<p>Direct economic loss due to cultural heritage damaged or destroyed by hazardous events.</p> <p>Data to be collected [Minimum Requirement]: C-8d Number of buildings, monuments and fixed infrastructures of cultural heritage assets C-8e Number of mobile cultural heritage assets (such as artworks) damaged C-8f Number of mobile cultural heritage assets destroyed C-8a Cost of Rehabilitation or Reconstruction of C-8d C-8b Cost of Rehabilitation or Reconstruction of C-8e C-8c Market value of C-8f</p>	Y	N
C-9	<p>Direct economic loss due to environment degraded by hazardous events.</p> <p>Data to be collected [Minimum Requirement]: C-9b Hectares of Forest affected</p> <p>Recommended disaggregation:</p> <ul style="list-style-type: none"> - By type level of affectation (damaged/destroyed) 	Y	N
C-10	Total insured direct losses due to hazardous events	Y	Y

Physical damage indicators will allow the connection of loss data with risk assessments and disaster forensics in the future. It will make the assessment of direct losses more transparent, and will allow, among other things, the incremental improvement of assessment as improved methodologies are developed, and better and more comprehensive baseline data is collected by countries.

Statistical processing:

Disaster loss data is greatly influenced by large-scale catastrophic events, which represent important outliers also in terms of economic loss. UNISDR recommends countries report the data by hazardous event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (outliers) can be included or excluded.

Target D: updated concept note on methodology

1. Overview

Target D: Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

This Non-paper is based on the Concept Note that was developed by the Secretariat at the request of Member States. The methodology described in the Concept Note is based on the work published in the Global Assessment Report on Disaster Risk Reduction (GAR), and has been enriched and guided by the comments and suggestions raised in the OEIWG. The methodology has been tested with datasets of 82 countries, found in the 2015 GAR, using 350,000 reports of small, medium and large scale disasters.

This methodology proposes the collection and use of a **simple inventory of situations in which either damage** (expressed as the number of assets damaged) **was recorded to critical infrastructures OR situations in which the provision of the basic service was affected to a noticeable degree**, including interruptions, partial interruptions and reduced quality of service.

2. Context

Target D refers to two separate but interconnected situations: a) situations in which critical infrastructure is damaged (without services necessarily being interrupted or compromised in terms of quality), and b) basic services that are interrupted (that could occur with or without damage). These two aspects were discussed in the First and Second Sessions of the OEIWG, and Members agreed that the chosen indicator will have to consider the two impacts to critical infrastructure.

Interruption of basic services, in turn, could be measured not only as those situations in which the service is completely shut down, but those in which there is either a partial interruption of the service or a reduction in the quality of the service provided. Other elements to take into account are the length of time these interruptions last and the number of users that suffer the interruption or lower quality of service.

Combining all these elements can be complex and would demand enormous effort in data collection by countries, especially for the period of the baseline where all situations involving damage or interruption must be revisited for the period 2005-2015.

The proposed Indicators monitor the two elements of Target D: “**damage to critical infrastructures**” and “**disruption of basic services**”. The Indicators proposed are also used and included in direct economic loss indicators (Target C) and affected people (Target B), thereby reducing the burden of data collection.

Indicators **D-2 to D-4** directly monitor the elements of “**damage to critical infrastructures**” by measuring the **number of times** and the **number of facilities** which provide Education, Health and Transportation services are damaged or destroyed. These also indirectly monitor elements of

“**disruption of basic services**” associated with these infrastructures. Indicator **D-5 and its sub-indicators** directly monitor the elements of “**disruption of basic services**” by counting the number of times the provision of basic services are disrupted, either by interruptions of the services, by damage to the facilities that provide the service, or by a measurable reduction in the quality of the service or the population covered by the service – or combination of all the above.

The methodology recommended in the Concept Note proposes three alternative methodologies for the creation of an index that combines these two elements and its indicators, and additionally proposes the **correlation of this index with the population** of the country in order to reflect the importance of damage to critical infrastructure and basic services in small countries.

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016.

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
D-1	Damage to critical infrastructure due to hazardous events.	Y	N
D-2	Number of health facilities destroyed or damaged by hazardous events.	Y	Y
D-3	Number of educational facilities destroyed or damaged by hazardous events.	Y	Y
D-4	Number of transportation units and infrastructures destroyed or damaged by hazardous events.	Y	N
D-4b	Kilometres of road destroyed or damaged per hazardous event.	Y	Y
D-4c	Number of bridges destroyed/damaged by hazardous event.	Y	N
D-4d	Kilometres of railway destroyed / damaged by hazardous event.	Y	N
D-4k	Number of airports destroyed / damaged by hazardous event	Y	N
D-4l	Number of ports destroyed / damaged by hazardous event	Y	N
D-1 bis ¹¹	Number of electricity plants / transmission lines destroyed or damaged by hazardous events.	Y	N
D-5	Number of times basic services have been disrupted due to hazardous events.	Y	Y ¹²

¹¹ D-1 bis reflects the numbering of the Working Text on Indicators. The Secretariat recommends the retention of the indicator as a component of the compound indicator D-1; in which case D-1 bis should be renumbered in the Working Text.

¹² Data is available for many, but not all, of the services D-5a to D-5j described in Section 5 below.

Summary of Computing Methodology:

Indicator D-1 is a compound indicator, that can be calculated based on the value of indicators D-2 to D-5, and D-1 bis, and specified data to be collected. The methodology is described in the Concept Note in Annex, and summarized below.

Indicator D-4 should measure (i) road (in kilometres of paved/unpaved), (ii) railway (in kilometres), (iii) port (number of facilities), and (iv) airport (number of facilities).

Indicator D-5 (for which methodology AND data exists) measures only the **Number** of times basic services have been disrupted due to hazardous events.

One of the challenges of Target D is that it refers to two separate but interconnected situations. The first is the situation in which **critical infrastructure is damaged** (without services necessarily being interrupted or compromised in terms of quality) and the second is when **basic services are interrupted** (which could potentially happen with or without damage). The proposed methodology considers the two impacts to critical infrastructure, one being the damage and the second the interruption of basic services.

Interruption of basic services, in turn, could be measured not only as those situations in which the service is completely shut down, but those in which there is either a partial interruption of the service or a reduction in the coverage and/or quality of the service provided.

The proposed data to be collected allows independent monitoring of the two elements of “**damage to critical infrastructures**” and “**disruption of basic services**” of Target D. They also monitor elements included in direct economic loss (Target C) and affected people (Target B).

The methodology proposed by the Secretariat suggests the collection and use of a **simple inventory of situations in which either damage** (expressed as the number of assets damaged) **was recorded to critical infrastructures AND/OR situations in which the provision of the basic service was affected to a noticeable degree**, including interruptions, partial interruptions and reduced coverage or quality of service.

Indicators **D-2 to D-4** specifically monitor the elements of “**damage to critical infrastructures**” by measuring the **number of times** and the **number of facilities** providing Education, Health and Transportation services are damaged or destroyed. These also indirectly monitor elements of “disruption of basic services” associated to these infrastructures in Target D. The indicators proposed are also used and included in direct economic loss indicators (Target C) and affected people (Target B), reducing in this way the burden of data collection.

Indicator **D-5 and its sub-indicators** directly monitor the elements of “**disruption of basic services**” of Target D by counting the number of times the provision of basic services are disrupted, either by interruptions of the services, by damage to the facilities that provide the service or by a measurable reduction in the quality of the service or the population covered by the service – or combination of all the above.

The Secretariat proposes several options to calculate an **Index of Critical Infrastructure Damage and Service Interruptions**, all of which follow this general pattern:

Index of Critical Infrastructure Damage and Service Interruptions =

$$\text{number of times interruption or damage occurs/ population} * 100,000$$

The figure **number of times interruption or damage occurs** uses data collected and reported from national disaster loss databases.

The following are three options that could compute the number of interruptions in different ways, from simple to more complicated:

- a) Simple count of number of events in which an interruption or damage is accounted for (each hazardous event in which any interruption or damage occurs is counted as one).
- b) Consolidated count of sectors/services with interruptions or damages (the number of sectors or services that were damaged or interrupted is counted).
- c) Consolidated count of interruptions or damages per sector with emphasis on health and education facilities (the number of health and education facilities affected, plus the number of other sectors or services damaged or interrupted).

The Secretariat recommends option b), as the most simple and representative for data collection.

Data collection and reporting is recommended for the following Services:

Education (D-2)	Water (D-5d)
Health (D-3)	Sewerage (D-5e)
Transport (D-5a)	Government (D-5f)
Energy (D-5b)	Emergency services (D-5g)
Communications ICT (D-5c)	Solid Waste

4. Applicable Working Definitions and Terminology

Target D of the Sendai Framework specifically requires “damage to critical infrastructure and disruption of basic services” to be estimated. For the purposes of this methodology, unless stated otherwise, key terms pertaining to Critical Infrastructure and Basic Services are those defined in the document “Terminology for Disaster Risk Reduction: Technical working draft for the Chair” (September 2016) or are the working definitions identified in the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction of the 10 June 2016, both of which are developed on the basis of the “Working Text on Terminology” based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016.

Terminology:

Critical infrastructure: The physical structures, facilities, networks and other assets that are essential to the social and economic functioning of a society or community.

Annotation: Critical infrastructures are elements of the infrastructure that support essential services in a society, and the failure of which would have a significant impact on the society. They include electricity, water and transport systems, air and sea ports, communication systems, health and educational facilities, as well as basic services, including public administration and financial services, centres for fire and police.

Working Definition:

Basic services: Services that are needed for all of society to function [effectively / appropriately].

Annotation: Examples of basic services include water supply, sanitation, health care, education, housing, and food supply. They also include services provided by critical infrastructure such as electricity, telecommunications, transport, finance or waste management that are needed for all of society to function.

For this indicator, disruption, interruption or lower quality of basic services is proposed to be measured for the following public services:

Educational facilities: play schools, kindergartens, primary, secondary or middle schools, technical-vocational schools, colleges, universities, training centres, adult education, military schools and prison schools

Emergency Response: disaster management office, fire management service, police, army and emergency operation centres.

Healthcare facilities: health centres, clinics, local and regional hospitals, outpatient centres and in general facilities used by primary health providers

Information and Communication Technology (ICT) system: plants and telephone networks (telecommunication network), radio and television stations, post offices and public information offices, internet services, radio telephones and mobile phones

Power/energy system: generation facilities, transmission and distribution system and dispatch centres and other works

Sewerage system: sanitation and sanitary sewage systems and collection and treatment of solid waste.

Solid waste management: collection and treatment of solid waste.

Transport system: road networks, railways (including stations), airports and ports

Water supply: drinking water supply system (water outlets, water treatment plants, aqueducts and canals which carry drinking water, storage tanks.)

5. Critical issues, sources, data collection and statistical processing

Source and data collection

National disaster loss databases.

The Secretariat recommends that reporting against these indicators is undertaken using information collected in National disaster loss databases.

Not every country has a comparable national disaster loss database that is consistent with these guidelines (although current coverage exceeds 89 countries, providing data for Indicators D-1 to D-4). Therefore, by 2020, it is expected that all countries will build/adjust national disaster loss databases according to the recommendations and guidelines of the OEIWG.

Data collection

The Secretariat recommends that countries collect and report data in the form **of physical damage indicators, in all instances**. The following table summarizes the recommendations of the Secretariat for data to be collected and reported for measuring the global target:

No.	Indicator	Methodology	Data
D- 2	Number of health facilities destroyed or damaged by hazardous events. Data to be collected [Minimum Requirement]: D-2a Number of health facilities destroyed or damaged by hazardous events Recommended disaggregation: - By level of affectation (damaged/destroyed) - By size of Facility (small/medium/large)	Y	Y
D-3	Number of educational facilities destroyed or damaged by hazardous events Data to be collected [Minimum Requirement]: D-3a Number of educational facilities destroyed or damaged by hazardous events Recommended disaggregation: - By level of affectation (damaged/destroyed) - By size of Facility (small/medium/large)	Y	Y
D-4	Number of transportation units and infrastructures destroyed or damaged by hazardous events Data to be collected [Minimum Requirement]: D-4b Kilometres of road destroyed or damaged per hazardous event. D-4c Number of bridges destroyed/damaged by hazardous event. D-4d Kilometers of railway destroyed / damaged by hazardous event. D-4k Number of airports destroyed / damaged by hazardous event D-4l Number of ports destroyed / damaged by hazardous event Recommended disaggregation: - By level of affectation (damaged/destroyed) - D-4b by type of road (unpaved, single paved, highway)	Y	Y
D-1 bis	Number of electricity plants / transmission lines destroyed or damaged by hazardous events.	Y	N

D-5	<p>Number of times basic services have been disrupted due to hazardous events.</p> <p>Data to be collected [Minimum Requirement]: D-5a Education services were interrupted. (linked to D-2) D-5b Water services were interrupted. D-5c Health services were interrupted. (linked to D-3) D-5d Sewerage services were interrupted. D-5e Transport services were interrupted. (linked to D-4) D-5f Government services were interrupted. D-5g Energy services were interrupted. D-5h Emergency services were interrupted. D-5i Communications services were interrupted. D-5j Solid Waste services were interrupted.</p> <p>Recommended disaggregation: None recommended.</p> <p>Interrupted means one or a combination of the following: - Provision of the service was partially or totally interrupted - Level of quality of the service was degraded - Coverage of the service was reduced</p>	Y	Y
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For Indicators D-2 to D-4, the Secretariat recommends disaggregation by damaged and destroyed, and for Indicators D-2 and D-3, by the size of facility, which will allow for more accurate calculations of indicators of Target C. Simply counting the number of facilities, roads or networks damaged or destroyed does not necessarily allow an understanding of the size of the facility affected, nor the related impact on the community served by that facility.

Physical damage indicators will allow the connection of loss data with risk assessments and disaster forensics in the future. It will make the assessment of direct losses more transparent, and will allow, among other things, the incremental improvement of assessment as improved methodologies are developed, and better and more comprehensive baseline data are collected by countries.

Statistical processing:

Disaster loss data is greatly influenced by large-scale catastrophic events, which represent important outliers in terms of damage and interruptions to critical infrastructure. UNISDR recommends countries report the data by hazardous event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (outliers) can be included or excluded.

Disaggregation

Further to the recommendations of both the OEIWG and the IAEG-SDGs, and in addition to the note in the preamble of this document, the Secretariat recommends disaggregating data by:

- asset (health/education/road) (for D-1),
- destroyed/damaged (for D-2, D-3, D-4),
- size of facility (small, medium, large) (for D-2, D-3)
- transportation mode (for D-4),
- service sector (for D-5).

Target E: updated concept note on methodology

1. Overview

Target E: *Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020*

This Non-paper is based on the previous Concept Notes that was developed by the Secretariat at the request of Member States. The approach described in the Concept Notes is based on the experiences of countries in implementing the Hyogo Framework for Action 2005-2015 (HFA) and analysis of the reports of the 140+ countries that undertook at least one cycle of self-assessment of progress in implementing the HFA. It is also informed by deliberations of Members of both the OEIWG and the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs).

2. Context

Members of both the OEIWG and the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) have called for quantitative indicators to measure the level of progress, rather than applying only yes/no as regards strategy and plan availability. This argument can be applied to either national or local level. Members also discussed the importance of the population coverage of such strategies, so as to ensure a people-centred approach.

In response the Secretariat has proposed computation methodologies that allow the monitoring of improvement in national and local disaster risk reduction strategies over time. These methodologies range from a simple quantitative assessment of the number of these strategies, to a qualitative measure (progress index) of alignment with the Sendai Framework, as well as population coverage for local strategies.

National and local disaster risk reduction strategies should be based on, and aligned with, the scope, outcomes, guiding principles, and priorities for action of the Sendai Framework. The Sendai Framework states that *national and local disaster risk reduction strategies and plans* should be adopted and implemented to strengthen disaster risk governance to manage disaster risk.

Drawing principally from Paragraph 27 of the Sendai Framework, the Secretariat suggests the following five elements as **core requirements** for national disaster risk reduction strategies, which should be based on disaster loss and risk information:

- a. The existence of legislative or regulatory frameworks to mainstream and integrate disaster risk reduction within and across all sectors, promote policy coherence and compliance, and guide public and private sectors by defining roles and responsibilities.
- b. Clear time frames, targets and indicators.
- c. Explicit objectives and measures aimed at preventing the creation of risk, reducing existing risk, and strengthening economic, social, health and environmental resilience.
- d. Assessments of technical, financial and administrative disaster risk management capacity to identify risks at the local and national levels.
- e. Strengthened mechanisms to follow-up, periodically assess and publicly report on progress.

As for local disaster risk reduction strategies, the components that make up individual strategies are numerous, vary across countries and local administrative units, and change over time. The responsibility for the development of local disaster risk reduction strategies generally falls to respective local governments, the responsibilities, characteristics and capabilities of which can vary significantly between and within countries. In general, national disaster risk reduction strategies serve a normative function, providing inter alia guiding principles and an overarching framework for disaster risk reduction. Local strategies, aligned with the national strategy, are generally more specific, reflecting local context and hazard profile, and tend to focus on planning and implementation with clear roles and tasks assigned at local level.

Countries may wish to draw from relevant sections of the Sendai Framework, as well as other guidance¹³, when determining indicators appropriate to country context for national level monitoring of their local strategies.

The methodology detailed in the Concept Note proposes that countries must identify which hazards are to be targeted in national and local strategies, and an appropriate weighting accorded (considering factors such as impacts on loss/damage and frequency for instance).

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of OEIWG, from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016.

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
E-1	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030	Y	N
E-2	Percentage of local governments that adopt and implement local DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030	Y	N

Summary of Computing Methodology:

Globally, the indicators for achievement of the global Target E are quantitative and monitor the number of countries and local governments with strategies. However, in order to monitor improvements in the quality of national strategies over time and to assess whether they are aligned with the Sendai Framework, Member States may apply a weighted approach to measuring the aforementioned five core requirements.

¹³ For instance: the Ten Essentials (www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=1) or the new Local-Urban Indicators for disaster risk reduction and resilience (www.unisdr.org/campaign/resilientcities/home/toolkitblkitem/?id=18)

For indicator E-1, the Secretariat proposes that the five core requirements are weighted equally by assigning 20% (or 0.2) to each requirement and calculating overall progress scores accordingly. Additionally and optionally, though computation is more complicated, measuring levels of achievement could be introduced in each element¹⁴ to measure the progress in a more sophisticated manner. Member States are encouraged to give particular notice to risk considerations across all sectors as highlighted in the first core requirement.

For indicator E-2, the Secretariat proposes that Member States are to identify local governments that adopt and implement local DRR strategies in line with the Sendai Framework. There are two options to calculate percentage, (i) the number of the local governments and (ii) the population share. The Secretariat recommends the population share, which can measure progress according to the ratio of population covered by local strategies in relation to total population.

4. Applicable Working Definitions and Terminology

Target E of the Sendai Framework specifically requires “the progress of national and local DRR strategies” to be estimated. For the purposes of this methodology, unless stated otherwise, key terms are those defined in the document “Terminology for Disaster Risk Reduction: Technical working draft for the Chair” (September 2016) or are the *working definitions* identified in the Technical Collection of Concept Notes on Indicators for the Seven Global Targets of the Sendai Framework for Disaster Risk Reduction of the 10 June 2016, both of which are developed on the basis of the “Working Text on Terminology” based on negotiations during the Second Session of the OEIWG held in Geneva, Switzerland from 10-11 February 2016, issued on 3 March 2016, reissued with factual corrections on 24 March 2016.

Terminology:

Disaster risk management: Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses..

Disaster risk reduction: Disaster risk reduction is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contributes to strengthening resilience and therefore to the achievement of sustainable development.

Disaster risk reduction strategies and plans: define goals and objectives across different timescales and with concrete targets, indicators and time frames. In line with the Sendai Framework, these should be aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience.

¹⁴ For example, four levels of progress could make up each score according to the following weighting:

- i. Comprehensive achievement (full score): 1.0,
- ii. Substantial achievement, additional progress required: 0.75,
- iii. Moderate achievement, neither comprehensive nor substantial: 0.50,
- iv. Limited achievement: 0.25,

Working Definition:

Local Government: Form of sub-national public administration – to be determined by countries for the purposes of monitoring Target E and measuring progress in establishing local disaster risk reduction strategies – and which generally acts within delegated powers by legislative or regulatory frameworks of the higher level of government.

5. Critical issues, sources, data collection and statistical processing:

Source and data collection

The Secretariat recommends a summation of data from National Progress Reports of the updated HFA Monitor, provisionally named the Sendai Framework Monitor, reported by countries and local governments. So far 140+ countries undertook voluntary self-assessment of progress in implementing the Hyogo Framework for Action during the four reporting cycles to 2015 using the HFA Monitor, generating the world's largest repository of information on national DRR policy inter alia. A baseline is expected to be created after the conclusion of works by OEIWG, which will facilitate reporting on progress in achieving the relevant targets of both the Sendai Framework and the SDGs.

Target G: updated concept note on methodology

1. Overview

Target G: *Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030*

This Non-paper is based on the Concept Note that was developed by the Secretariat at the request of Member States. The Concept Note is based on previous experience of a number of governments, academic and research institutions, private organizations and work of the United Nations. It is informed, inter alia, by experts from the World Meteorological Organization (WMO) and the National Meteorological and Hydrological Services (NMHSs) of its Members. The note also draws from the analysis of the reports of the 140+ countries that undertook at least one cycle of self-assessment of progress in implementing the HFA, as well as the work that underpins the Global Assessment Reports on Disaster Risk Reduction (GAR) (UNISDR, 2009a, 2011, 2013 and 2015), including experience gained in developing and employing a probabilistic global risk model.

The methodology outlined in the Concept Note proposes the use of simple and realistic indicators to measure progress, and aims to produce an approximate value (a “proxy”) that provides a verifiable, consistent and homogeneously estimated measure of the number of people with access to Multi-Hazard Early Warning Systems (MHEWS), risk information and assessments. Consistent with the deliberations of the OEIWG, the Secretariat recommends that Members examine **quantitative indicators to measure quality**; thereby measuring the level of progress.

2. Context

This non-paper presents the indicators recommended by the Secretariat, as well as identifying the key issues identified in the Concept Note, which must be considered when implementing Member States’ recommendations for the estimation of Target G.

Given the complexity and wide variation between countries in the elements and conditions that give rise to effective MHEWS and accessible risk information and assessment, the Secretariat makes several suggestions in the Concept Note. These can be summarized as follows:

Multi-Hazard Early Warning Systems (MHEWS):

The Secretariat suggests that the outcome of the Third International Conference on Early Warning 2006 be used as the basis for the development of such indicators.

The Secretariat recommends using the four indispensable components of effective EWS as the basis for proposed global indicators, all of which need to be coordinated across many agencies at national to local levels;

1. risk knowledge based on the systematic collection of data and risk assessment;
2. detection, monitoring, analysis and forecasting of the hazards and possible consequences;
3. dissemination and communication of authoritative, timely, accurate and actionable warnings and associated information on likelihood and impact;
4. preparedness and local capabilities to respond to the warnings received.

As the characteristics of MHEWS differ from country to country, the Concept Note proposes a focus on the degree of achievement rather than simply counting the number of countries with MHEWS that fully meet the four components. Methodologies include incremental measurements using the MHEWS Checklist (ISDR 2006), as well as those including population or geographical coverage.

It is recommended that each country specify the major hazards to be included in a "multi-hazard" EWS; indicators should subsequently be weighted accordingly when reporting.

Disaster risk information and assessments:

The Secretariat similarly suggests that in measuring quality, countries assess the extent to which the disaster risk information and assessments meet the following five components, as described in Paragraph 24 of the Sendai Framework:

1. baselines and periodic assessment of disaster risks, vulnerability, capacity, exposure, hazard characteristics and their possible sequential effects, of a social and spatial scale, on ecosystems,
2. periodic update and dissemination of location-based disaster risk information, taking into account different needs, including risk maps to decision makers, the general public and communities at risk,
3. systematic evaluation, recording, sharing and publicly accounting for disaster losses and impacts, in the context of event-specific hazard-exposure and vulnerability information,
4. available and accessible information on non-sensitive hazard-exposure, vulnerability, risk, disaster and disaggregated loss, with real time access to reliable data, space and in situ information enhanced by innovative ICT for measurement, collection, analysis and dissemination,
5. capacity building of government officials at all levels, civil society, communities and volunteers, as well as the private sector, through sharing experiences, good practices, and education.

It is also recommended that each country specify the major hazards for which access to risk information is essential; indicators should subsequently be weighted accordingly when reporting.

The elements of which effective **MHEWS** is comprised, and the elements that give rise to accessible **risk information and assessment**, are many and complex. Given the challenges in assessing all key elements of available and accessible MHEWS, risk information and assessment, the Secretariat suggests that Members explore indicators that focus on evaluating the functional elements of each as a proxy for the Target.

Note that local governments which are not hazard prone thus would be exempted from the estimation of progress, by excluding them from the denominator.

3. Recommended Indicators

The following table summarises the recommendations by the Secretariat with regard to the indicators proposed by Member States and described in the Working Text on Indicators, based on negotiations during the Second Session of the Open-ended Inter-Governmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction held in Geneva, Switzerland from 10-11 February 2016. Issued on 3 March 2016. Reissued with factual corrections on 24 March 2016.

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
G-1	Number of countries that have multi-hazard early warning system.	Y	N
G-2	Number of countries that have multi-hazard monitoring and forecasting system.	Y	N
G-3	Number of people who are covered by and have access to multi-hazard early warning system per 100,000	Y	N
G-4	Number of local governments having a preparedness plan (including EWS) or evacuation plan with standard operating procedures.	Y	N
G-5	Number of countries that have multi-hazard national risk assessment / information, with results in an accessible, understandable and usable format for stakeholders and people.	Y	N
G-6	Number of local governments that have multi-hazard risk assessment / risk information, with results in an accessible, understandable and usable format for stakeholders and people.	Y	N

Summary of Computing Methodology:

The Concept Note outlines options for the methodology to be employed in measuring progress in making MHEWS and risk information and assessments available and accessible.

Indicator G-1 is a compound indicator **for MHEWS**, calculated using equally weighted indicators representing the aforementioned four components of MHEWS, namely **G-2 through G-4 and G-6**. Additionally, to measure the progress better, the Secretariat proposes the level of effectiveness/achievement in each element¹⁵.

For indicators G-2 through G-4, the Secretariat proposes that countries measure the extent to which each component of MHEWS corresponding to each indicator meets the Checklist (ISDR 2006), also with four levels of achievement. In this way the extent to which each component has been achieved can be measured.

¹⁵ For instance, when the level is set by 4 and weighed equally, the score is calculated by multiplying the following weights in each element and make summation.

- i. Comprehensive achievement (full score), 1.0,
- ii. Substantial achievement, additional progress required; 0.75,
- iii. Moderate achievement, neither comprehensive nor substantial; 0.50,
- iv. Limited achievement; 0.25,

For indicators G-5 and G-6, quantitative indicators with four levels of achievement are also proposed for **risk information and assessment**, which according an equal weighting for each of the aforementioned five components, measures the extent to which these are met.

Moreover, if data is available, coverage (e.g. exposed or vulnerable populations) could ideally be introduced for each hazard and for each indicator, so as to measure the progress more accurately.

It is recommended that each country specify the major hazards to be included in the indicators and their weights; indicators should subsequently be weighted accordingly when reporting.

4. Applicable Working Definitions and Terminology

Terminology:

Early warning system: An interrelated and connected set of hazard monitoring, risk assessment, communication and preparedness activities that enable individuals, communities, governments, businesses and others to take timely action to reduce their risks in advance of hazardous events.

Multi-hazard early warning systems cover a range of hazards and impacts. They are designed to be used in multi-hazard contexts where hazardous events may occur simultaneously or cumulatively over time, and taking into account the potential interrelated effects. A multi-hazard early warning system increases the efficiency and consistency of warnings through coordinated and compatible mechanisms and capacities, involving multiple disciplines for updated and accurate hazards identification and monitoring.

Hazard: A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation..

*Annotation: Hazards may be natural, anthropogenic or socio-natural in origin. **Natural hazards** are predominantly associated with natural processes and phenomena. **Anthropogenic hazards**, or man-made hazards, are induced entirely or predominantly by human activities and choices. Several hazards are **socio-natural** in that they are associated with a combination of natural and anthropogenic factors, including environmental degradation and climate change.*

Hazards may be single, sequential or combined in their origin and effects. Each hazards is characterised by its location, intensity, frequency and probability.

Hazardous Event: The manifestation of a hazard in a particular place during a particular period of time.

Multi-hazard: means the (1) selection of multiple major hazards that the country faces, and (2) specific contexts where hazardous events may occur simultaneously, cascadingly or cumulatively over time, and taking into account the potential interrelated effects.

Hazards include (as mentioned in the Sendai Framework for Disaster Risk Reduction and in alphabetical order) biological, environmental, geological, hydro-meteorological and technological processes and phenomena.

Preparedness: The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current disasters.

A **preparedness plan** establishes arrangements in advance to enable timely, effective and appropriate responses to specific potential events or emerging situations that might threaten society or the environment.

Risk assessment: A quantitative approach to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend..

Annotation: Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic dimensions, [environmental impact assessment,] and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. This series of activities is sometimes known as a risk analysis process.

Risk information: Comprehensive information on all dimensions of risk including hazards, exposure, vulnerability and capacity related to persons, communities, organizations and countries and their assets.

Working Definition:

Forecast: Definite statement or statistical estimate of the likely occurrence of a future hazardous event or conditions for a specific area.

Annotation: In meteorology a forecast refers to a future condition, whereas a warning refers to a potential occurrence of a hazardous event.

Local Government: Form of public administration at the lowest tier of administration charged with the responsibility for disaster risk reduction within a designated territory, which generally acts within delegated powers by legislation or directives of the higher level of government.

5. Critical issues, sources, data collection and statistical processing:

Source and data collection

The Secretariat recommends a summation of data from National Progress Reports of the updated HFA Monitor, provisionally named the Sendai Framework Monitor, reported by countries and local governments. So far 140+ countries undertook voluntary self-assessment of progress in implementing the Hyogo Framework for Action during the four reporting cycles to 2015 using the HFA Monitor, generating the world's largest repository of information on national DRR policy inter alia.

The data required to report against the above indicators for both MHEWS and risk assessment / risk information are currently not widely available. In many instances, the hazards to be included in a

MHEWS and risk assessment will need to be identified. The selection of principal hazards to be included in a MHEWS and risk assessment should be determined by countries at the national level, such that they capture all hazardous events of a relevant scale and frequency.

As MHEWS generally have a defined scope and coverage that is specific to a particular geography or population, Members may consider the determination of progress in coverage to be important. The selection of principal hazards to be included in a MHEWS and risk assessments remains a national determination, in measuring the global Target and recognising that hazardous events differ greatly - from large-scale, often low-frequency events such as earthquakes, cyclonic winds, and tsunamis, to small-scale, high-frequency hazardous events such as floods.

Ideally coverage may be required, however, determining the exposed population will be challenging. Then the use of a proxy is suggested – for example, the total population in targeted sub-national administrative units. In calculating coverage, Members will need to deliberate on the denominator to be used in computation, notably with regard to population coverage.

Furthermore, identifying the availability of, and populations' access to, risk information and assessments will be challenging. Notwithstanding, defining whether this is reaching the most exposed or vulnerable populations is necessary. The Secretariat therefore makes recommendations in the Concept Note for possible proxy indicators to be applied at the national level.

Such efforts can be supported by technical groups and initiatives, including those supporting the development of MHEWS.

Double-counting:

As more than one MHEWS can cover the same geography or population, the risk of double counting is high. Members should consider the consistency of information to be collected if this is to be avoided.