Part II: Implementation of the Sendai Framework and Disaster Risk-informed Sustainable Development

Introduction

As the complexity and range of risks evolve, the Sendai Framework represents a shift from mainstreaming disaster risk to an approach of managing the risks inherent in social, economic and environmental activity for sustainable development. It includes seven global targets, accompanied by a comprehensive set of guiding principles that give direction to reduce the impact of disasters, while also addressing the underlying drivers of disaster risk and safeguarding development gains for current and future generations. Transitioning towards resilient and sustainable societies hinges on responsible management of disaster risks. Member States have taken bold steps in developing and incorporating the goals, targets and indicators – and associated data – within national reporting systems.

This part introduces the global disaster risk landscape and takes stock of experience so far with a comparative analysis of country-specific evidence on national reporting, informed by the latest disaster data available. It sheds light on successes and challenges as they emerge from the first years of reporting and provides early lessons for further improvements. While the observed period is still too short to reach definitive conclusions on a global scale, we can observe certain patterns in terms of magnitude, geographic and socioeconomic distribution of disaster impacts and several departure points of where and how countries have managed to do better in reducing disaster risk.

By the time Member States agreed on the Sendai Framework, disaster risks compounded by climate change, environmental degradation, poverty and inequality were evolving rapidly, with cascading

MORTALITY

HIGH INCOME COUNTRIES

LOW AND MIDDLE INCOME COUNTRIES

More than 90% of mortality attributed to internationally reported disaster events has occurred in low and middle income countries

HYDRO-METEOROLOGICAL HAZARDS

Disasters associated to hydro-meteorological hazards account for about 2/3 of housing damages

Member States reporting on the status of their national and local disaster risk reduction strategies (Target E) are gradually increasing but are still in the minority.

(Source: UNDRR)

effects across geographic and income-level regions. The analysis in this part concludes with a review of the contribution of the UNDRR Sendai Framework Monitor (SFM) by underlining the cross-benefits of integrated reporting across the different global frameworks. Recognizing that extra efforts are required to manage these interactions, so that they become synergies, the analysis offers an overview of international and national developments in building coherence among the Sendai Framework and other post-2015 agreements.

The Sendai Framework is not alone in pursuing an integrated approach to risk reduction and development. Rather, it is an indivisible part of a series of international negotiated agreements made during 2015–2016: the 2030 Agenda,[1] the Paris Agreement on climate change (providing the foundation for sustainable, low-carbon and resilient development under a changing climate),[2] AAAA[3] adopted at the Third International Conference on Financing for Development (outlining a series of fiscally sustainable and nationally appropriate measures to realign financial flows with public goals and reduce structural risks to inclusive growth) and NUA adopted at the 2016 United Nations Conference on Housing and Sustainable Urban Development (introducing a new model of urban development that promotes equity, welfare and prosperity).[4]

1 (United Nations General Assembly 2015c)
2 (United Nations 2015c)
3 (United Nations 2015a)
4 (United Nations 2016b)

Chapter 7: Risk reduction across the 2030 Agenda

7.1

Sendai Framework targets and monitoring: a snapshot

The Sendai Framework's intended outcome is a "substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries" by 2030. The goal towards this, described in paragraph 17, is:

> *Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.*

The Sendai Framework outlines seven targets and four priority areas for action to strengthen resilience by preventing new and reducing existing disaster risks. The four priority areas are: (1) understanding disaster risk, (2) strengthening disaster risk governance to manage disaster risk, (3) investing in DRR for resilience and (4) enhancing disaster preparedness for effective response and "build back better" in recovery, rehabilitation and reconstruction.[5]

An increasingly diverse spectrum of stakeholders has made significant efforts since 2015 to implement the Sendai Framework, reaching across different geographies, sectors, jurisdictions and scales. These efforts are organized to pursue the realization of one key outcome and goal, and seven global targets (A–G), as set out in Table 7.1.

5 (United Nations 2015b)

Table 7.1. **Seven global targets of the Sendai Framework**

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	
A-1	Number of deaths and missing persons attributed to disasters, per 100,000 population (this indicator should be computed based on Indicators A-2, A-3 and population figures)
A-2	Number of deaths attributed to disasters, per 100,000 population
A-3	Number of missing persons attributed to disasters, per 100,000 population
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	
B-1	Number of directly affected people attributed to disasters, per 100,000 population (this indicator should be computed based on Indicators B-2 to B-6 and population figures)
B-2	Number of injured or ill people attributed to disasters, per 100,000 population
B-3	Number of people whose damaged dwellings were attributed to disasters
B-4	Number of people whose destroyed dwellings were attributed to disasters
B-5	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters
Target C: Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030	
C-1	Direct economic loss due to hazardous events in relation to global gross domestic product (this indicator should be computed based on Indicators C-2 to C-6 and GDP figures)
C-2	Direct agricultural loss attributed to disasters (agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure)
C-3	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters
C-4	Direct economic loss in the housing sector attributed to disasters (data would be disaggregated according to damaged and destroyed dwellings)
C-5	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters
C-6	Direct economic loss to cultural heritage damaged or destroyed attributed to disasters
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	
D-1	Damage to critical infrastructure attributed to disasters
D-2	Number of destroyed or damaged health facilities attributed to disasters
D-3	Number of destroyed or damaged educational facilities attributed to disasters
D-4	Number of other destroyed or damaged critical infrastructure units and facilities attributed to disasters
D-5	Number of disruptions to basic services attributed to disasters (this indicator should be computed based on Indicators D-6 to D-8)
D-6	Number of disruptions to educational services attributed to disasters
D-7	Number of disruptions to health services attributed to disasters

D-8	Number of disruptions to other basic services attributed to disasters
Target E: Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020	
E-1	Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030
E-2	Percentage of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies (information should be provided on the appropriate levels of government below the national level with responsibility for disaster risk reduction)
Target F: Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030	
F-1	Total official international support (official development assistance (ODA) plus other official flows), for national disaster risk reduction actions (Reporting of the provision or receipt of international cooperation for disaster risk reduction shall be done in accordance with the modalities applied in respective countries. Recipient countries are encouraged to provide information on the estimated amount of national disaster risk reduction expenditure.)
F-2	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided by multilateral agencies
F-3	Total official international support (ODA plus other official flows) for national disaster risk reduction actions provided bilaterally
F-4	Total official international support (ODA plus other official flows) for the transfer and exchange of disaster risk reduction-related technology
F-5	Number of international, regional and bilateral programmes and initiatives for the transfer and exchange of science, technology and innovation in disaster risk reduction for developing countries
F-6	Total official international support (ODA plus other official flows) for disaster risk reduction capacity-building
F-7	Number of international, regional and bilateral programmes and initiatives for disaster risk reduction-related capacity-building in developing countries
F-8	Number of developing countries supported by international, regional and bilateral initiatives to strengthen their disaster risk reduction-related statistical capacity
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	
G-1	Number of countries that have multi-hazard early warning systems
G-2	Number of countries that have multi-hazard monitoring and forecasting systems
G-3	Number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms
G-4	Percentage of local governments having a plan to act on early warnings
G-5	Number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels
G-6	Percentage of population exposed to or at risk from disasters protected through pre-emptive evacuation following early warning (Member States in a position to do so are encouraged to provide information on the number of evacuated people)

Realization of the outcome, goal and targets is made possible thanks to the significant efforts of Member States under the Hyogo Framework for Action (HFA) 2005–2015. While HFA focused on DRR as an evolution from disaster response and management,[6] the Sendai Framework supports a shift in paradigm. It focuses on a much wider hazard and risk scope, to include natural and man-made, environmental, technological, and biological hazards and risks. It emphasizes the reduction of existing risk and underscores that prevention of new risks is essential to sustainable development (without which development gains will be reversed).

During the HFA period, the monitoring system consisted of biennial self-assessment reporting by Member States and regional intergovernmental organizations. This identified trends, areas of progress and challenges, based on 22 core, principally policy, indicators, according to the five priorities for action. Many Member States participated, with approximately 80% providing national reports at least once over four biennial monitoring cycles since 2007. Sixty-one countries developed reports for 2007–2009, 105 for 2009–2011, 101 for 2011–2013 and 95 for 2013–2015.

The HFA core indicators focused on inputs rather than outputs or outcomes. However, the Sendai Framework has seven global targets, four of which are outcome focused. Consistent with the shift to managing risk, the four targets from A to D are objective and measurable, with the reduction of disaster losses to be assessed relative to the size of national population and economy. Targets A and B explicitly allow international benchmarking of progress relative to the quantitative baseline data of 2005–2015.

Although the Sendai Framework was agreed prior to SDGs, negotiations for the post-2015 agreements occurred in parallel and were mutually supportive. Accordingly, the Sendai Framework anticipates the review of the United Nations General Assembly of "global progress in the implementation of the Sendai Framework as part of its integrated and coordinated follow-up processes to United Nations conferences and summits, aligned with the Economic and Social Council, the High-level Political Forum on Sustainable Development and the quadrennial comprehensive policy review cycles, as appropriate, …" (para. 49). Similarly, the Sendai Framework recommended that indicators should be developed through an intergovernmental process by establishment of an Open-ended Intergovernmental Expert Working Group (OEIWG) on indicators and terminology relating to DRR. The work of this group took place in conjunction with the work of the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) (para. 50). From the second half of 2015, both intergovernmental groups and respective Secretariats – UNDRR and the United Nations Department of Economic and Social Affairs (UN DESA) – have collaborated closely to develop the global indicators and monitoring frameworks for the Sendai Framework and the 2030 Agenda.

Comprising experts nominated by Member States and relevant stakeholders, OEIWG developed the terminology relating to DRR and a set of 38 indicators of progress for the seven global targets. The recommendations for the indicators and the terminology were captured in the OEIWG report and were subsequently endorsed by the United Nations General Assembly in February 2017.[7]

OEIWG recommended that UNDRR takes forward the following work:

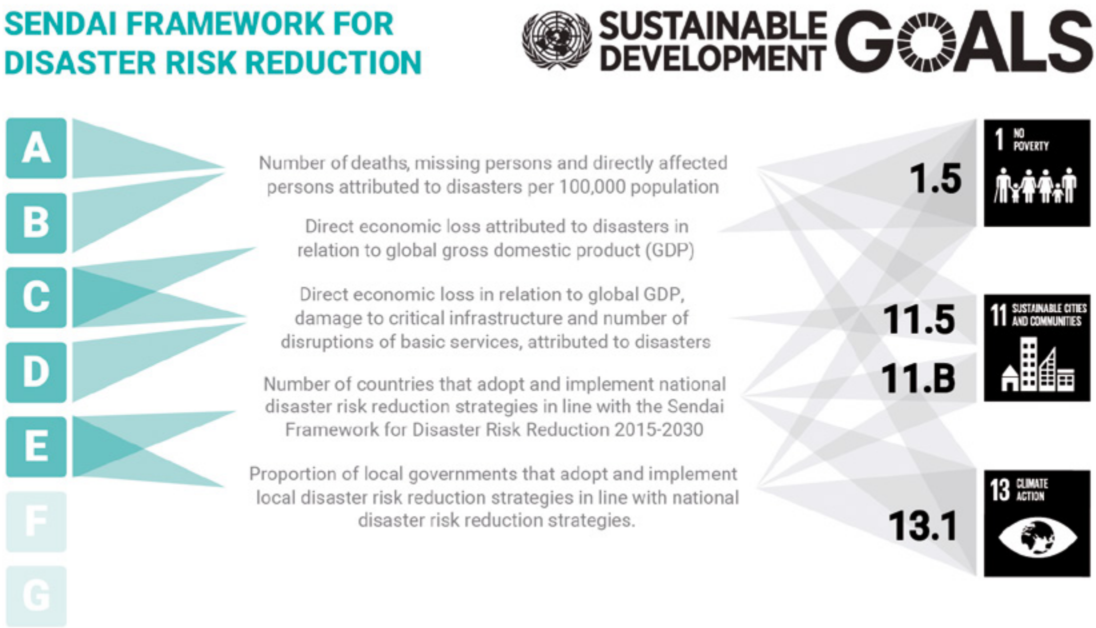
(a) *Develop minimum standards and metadata for disaster-related data, statistics and analysis with the engagement of national government focal points, national disaster risk reduction offices, national statistical offices, the Department of Economic and Social Affairs and other relevant partners;*

(b) *Develop methodologies for the measurement of indicators and the processing of statistical data with relevant technical partners;*

6 (United Nations 2007)
7 (United Nations General Assembly 2016b)

In parallel, Member States in IAEG-SDGs identified the explicit relationship between several targets of SDGs and DRR, namely SDGs 1, 11 and 13: eradication of poverty, resilient and sustainable cities, and action to climate change. IAEG-SDGs subsequently recognized the indicators recommended by OEIWG in measuring progress against the targets under these goals. This OEIWG report was endorsed by the United Nations Statistical Commission, at its forty-eighth session in March 2017. Common indicators, for which UNDRR was nominated as a custodian agency, are now in use for measuring progress in achieving the global Targets A–E of the Sendai Framework as well as the disaster-related targets of SDGs 1, 11 and 13. Monitoring between the two frameworks was therefore made a reality, reducing duplication of data-collection efforts and the reporting burden for countries.

Figure 7.1. Sendai Framework and the 2030 Agenda – multipurpose data, integrated monitoring and reporting



(Source: UNDRR)

To support the monitoring of the Sendai Framework and related elements of the 2030 Agenda, UNDRR was requested to develop an online SFM as the reporting mechanism for all Member States to report on their progress. UNDRR led a comprehensive process that included:[8]

- The Sendai Framework Data Readiness Review, which was conducted by Member States to assess capacity and ability to report against the 38 global indicators of the seven global targets of the Sendai Framework. This revealed gaps in data requirements of the Sendai Framework and data availability and monitoring capacity; no country reported that data was available or possible for all indicators.
- User-driven development of a prototype of the online SFM based on consultation with Member States and other partners. SFM was developed in partnership with the Enterprise Application Centre and went live on 1 March 2018.

- Development of technical guidance notes on the agreed global indicators covering minimum standards of data and metadata for disaster-related data and statistics, and methodologies for the measurement of indicators.[9] These were made available in January 2018 to assist Member States in the compilation of data for reporting using SFM. Initiated in OEIWG, when developing the technical guidance notes, UNDRR worked closely with NSOs of some Member States, as well as the statistical divisions of UN DESA and the United Nations Regional Economic Commissions (RECs) – in particular the United Nations Economic Commission for Europe (UNECE) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) – to support standard setting related to disaster statistics.
- Information reported in the monitor has been included in the 2017 and 2018 SDG reports of the 2018 High-level Political Forum (HLPF) on sustainable development. All indicators common to the targets of the Sendai Framework and SDGs are ranked as Tier I or Tier II in the SDG classification.[10]
- Comprehensive capacity-development exercises with national government institutions, to support Member States in systematic reporting using SFM. Designed to enable participation of a wide spectrum of stakeholders in the monitoring and reporting of progress – as effective risk reduction requires – national governments can select as many reporting institutions across different government and administrative levels as appropriate.
- Development of nationally determined custom targets and indicators – as per the recommendation of OEIWG – to support the monitoring of context-specific national strategies for DRR (Target E due to be achieved in 2020).
- Contributions from regional intergovernmental organizations to monitor and report progress of implementation in their regions using SFM.

The first cycle of reporting using SFM and its disaster loss database subsystem began in March 2018 for Targets A–E and informed the deliberations of the 2018 HLPF on sustainable development.[11] Rporting on the period 2015–2017 for Targets A–G took place in October 2018 and forms the basis of the analysis presented in Chapter 8 of this GAR.

7.2

Data required to monitor the targets

This section describes the types of country data required for monitoring the seven Sendai Framework targets. Such an overview will assist understanding of how the monitoring system gathers and uses data.

The global targets listed in Table 7.1 require measurement of three separate but interconnected types of indicator:

- The first type measures the concrete outcomes at the national level of implementing risk reduction in accordance with the Sendai Framework, in terms of a reduction in losses and disaster impacts. This includes reductions in mortality (Target A), number of people affected (Target B), direct economic loss (Target C) and damage to critical infrastructure and disruption to basic services (Target D). These targets measure some of the main benefits that implementing the Sendai Framework will bring for countries.

8 (United Nations 2017)
9 (United Nations 2017a); (UNISDR 2018b)
10 (United Nations Economic and Social Council 2017)
11 (United Nations Economic and Social Council 2018)

- The second type relates to Targets E and G and is a qualitative measure of how Member States have established the political and institutional mechanisms to enable them to reduce risk in line with the Sendai Framework, namely the development of DRR strategies and progress in the areas of multi-hazard early warning systems (MHEWSs) and risk information.
- The third type measures enhancements in international cooperation in line with Target F, which is not a measure of a concrete outcome or national implementation, but of the level and type of support for DRR from within the international community.

7.2.1

Targets A to D – disaster losses

Targets A, B, C and D are targets to reduce the losses attributed to disasters relating to mortality (A), number of people affected (B), economic loss relative to GDP (C) and damage to critical infrastructure and disruption of basic services (D). Each of these targets has several indicators of loss and damage. For example, Target A seeks a reduction in mortality caused by disasters and is measured by two indicators: number of deaths and number of missing people.

Each of these indicators may be presented in a more detailed way by disaggregating in relation to specific criteria/variables. For example, both of Target A's loss indicators (dead or missing) can be disaggregated by age, sex, income level, disability, hazard and location. As a consequence, what appears as one number will, in reality, be many numbers that describe the different facets of the main indicator.

The purpose of disaggregated data is to add value and analytical power to the information. Data disaggregated by age or sex, for example, will assist evidence-based understanding of how disasters differently affect children, youth, people with disabilities, older people or women in different stages of their life cycle. Disaggregation by hazard supports a heightened understanding of the impact of specific hazards and risks on a given community.

Given the complexity of this process, paragraph 24(d) of the Sendai Framework recommends that countries "systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information."

The best way to collect this data is by building, maintaining and systematically improving disaster loss databases. More countries around the world are using DesInventar Sendai, which is a simple and homogeneous methodology to collect, store, analyse and display data on losses caused by disasters. It uses definitions of hazards and impacts that are compliant with the Sendai Framework while employing indicators (including all 38 recommended by OEIWG) with possible disaggregation.[12]

Due to the level of detail at which this kind of data is captured, it is also possible to record losses associated with a range of small- and medium-scale recurring events that cause and accumulate damage, allowing the estimation of what is known as "extensive risk".[13] These small- and medium-scale disasters are frequently absent from global disaster databases but can have a corrosive effect on lives and livelihoods, especially in poor and vulnerable communities and households.

The data of SFM represents annual aggregates of the impacts of a myriad of small-, medium- and large-scale disasters. disaster loss databases allow consolidation of the annual data reported via SFM. DesInventar Sendai can generate these figures or provide for the automated electronic transfer of information to the global targets area of SFM.

One of the subsystems of SFM is a multi-country disaster loss database where information from multiple country-based, independent databases is collated, harmonized and integrated. From this system, consolidated loss data is automatically transferred to the corresponding targets and indicators from the SFM main system.

This large database (approximately 700,000 records at the time of writing) is made public along with GARs and is built using DesInventar Sendai. It is important to note that DesInventar Sendai is not used by all countries, although those Member States that build their own loss databases complying with the specifications in the technical guidance notes may use one of several alternatives for detailed loss data transfer to the Sendai Framework loss database.

Effective monitoring is ultimately in the hands of Member States, necessitating their active and sustained participation. A first review demonstrated the need for more detailed, well-structured disaster loss databases at national level, to enable measurement of outcomes under Targets A–D. This will be an area for focus on capacity-building and institutional coordination at national level in coming years. Such systems are valuable tools and data sets, which will contribute to a better understanding of risks and disaster impacts globally and at national level.

7.2.2

Target E – risk reduction strategies

Targets E and G differ from Targets A–D and F, in that they are qualitative in nature. Consequently, the nature of the data and thus the processes required to collect the data are distinct. Instead of taking numbers from a data source such as loss reports or national budget figures, those who report on Targets E and G must be familiar with the policy framework for DRR in their countries.

Target E, whose deadline for achievement is 2020, has two global indicators: (a) the number of countries that adopt and implement national DRR strategies in line with the Sendai Framework and (b) the percentage of local governments that adopt and implement local strategies in line with national strategies.

When reporting, Member States need to first identify the existence of national and local strategies, then apply 10 evaluative criteria of alignment of the national disaster strategy with the Sendai Framework. In this way, an indicative total "score" of the strategy's alignment is possible from a series of qualitative judgments.[14] Evaluators of the criteria will need expertise in DRR as well as familiarity with the strategies and relevant institutional architecture, legislation, availability of information, and programmes and processes associated with DRR in their country. There is a subjective element, as intermediate scores can be assigned optimistically or pessimistically with the corollary impact on the assessment score. But for as long as they are consistent over time and recognized as a qualitative measure of a different type than data such as disaster loss statistics, the criteria provide a useful methodology to assess national risk reduction strategies.

7.2.3

Target F – international cooperation

Target F requires the provision of financial data on international cooperation from recipient countries and provider countries.

Provide country data: Data for this target includes that reported on an annual calendar year basis by statistical reporters on international cooperation in national administrations. A statistical reporter, usually located in the national aid agency, Ministry of Foreign Affairs, or Ministry of Finance or Economy, is responsible for the collection of development assistance statistics in each country/

12 (UNISDR 2019a)
13 (UNISDR 2013b)
14 (UNISDR 2018b)

agency.[15] Historically, neither all donors nor recipients have systematically produced data pertaining to DRR; therefore, the requirements of the Sendai Framework reporting are expected to catalyse systematic collection of this data.

The technical guidance notes on Target F recommend statistical reporters apply a new policy marker for DRR, adopted by the OECD Working Party on Statistics,[16] which supports the statistical analysis of financial flows from provider to recipient countries. OECD designed the marker to inform deliberations of the OECD Development Assistance Committee (DAC). The marker is a qualitative statistical tool to identify and record aid activities that target DRR as a policy objective. It offers a methodology for greater specificity for providers and recipients. Data based on the marker provides a measure of the aid that DAC members (or, depending on where the marker and methodology is applied, within the aid budget of a ministry or appropriate agency) allocate in support of DRR, including a snapshot of:

- Individual DRR-focused projects/programmes
- Global estimate of aid committed for DRR
- Proportion of DAC member aid focused on DRR
- Sectors prioritized for DRR-focused aid
- Investments within individual sectors
- Aid prioritized by countries for DRR-focused purposes

In adopting the marker methodology, providers and recipients of aid have further options to generate disaggregated data, such as by sector. This is an approach consistent with that proposed for Targets A–D, wherein disaggregated data can be collected and used at the national level to inform policy and administrative decisions and at the international level to identify global trends, challenges and priorities for investment in risk reduction.

Recipient country data: OEIWG also encouraged recipient countries to provide information on the estimated amount of national DRR expenditure. By calculating national DRR expenditure using data from national accounts, recipient countries can estimate the proportion of total expenditure on national DRR actions that is accounted for by official international support. This responds to the observations of OEIWG members of the importance of demonstrating government policy leadership (of developing countries) in measuring the target.

The Rio Marker methodology, initially developed by OECD to track public investment in CCA, and later modified by UNDRR to be applied to DRR, has been tested in five countries of the South West Indian Ocean region and subsequently in 15 more countries in Asia, Latin America and Africa, where it helped to estimate national expenditure of recipient countries as part of a risk-sensitive budget review (RSBR).[17]

RSBR is a simple, systematic, quantitative analysis of a budget, or series of budgets, that enables countries to estimate and take credit for investment in DRR (the budget review methodology is described in Annex A[18] of each national report), and some countries are beginning to use this method to review public investment planning and financing strategies.[19] [20] If RSBR is conducted by a national government, the findings typically track public investment and can include inward financial flows. An RSBR conducted on a series of annual budgets allows for the identification and tracking of trends over time. An RSBR that also categorizes components of risk management can point to trends in focus such as increasing investment in prevention/risk reduction, as opposed to repeated response to disasters.

RSBR and OECD DRR aid marker methodologies can be combined by countries during budget reviews, depending on their context, to effectively obtain all of the figures required to report in SFM the international aid received, aimed at national DRR actions.

7.2.4

Target G - availability of and access to multi-hazard early warning systems and disaster risk information

Target G entails a series of qualitative measures to assess progress in substantially increasing "the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030." It has six global indicators, relating to the quality of MHEWSs, as well as that of disaster risk information and assessments. One of the indicators (G-6) is a unique output indicator that quantifies the impact and effectiveness of early warning information in terms of evacuated people.

Reporting for Target G requires a complex set of qualitative data around effective national systems for MHEWSs, for which guidance is provided in the UNDRR technical guidance manual.[21] The guidance is based on the deliberations of OEIWG that have also been informed by experts, through open consultations. The guidance also draws on the MHEWS checklist.[22]

7.3

Conclusions

The centrality of risk reduction to sustainable urbanization and development and CCA is unquestioned and hardwired into the post-2015 global development agendas. Ongoing effort at global, regional and national levels demonstrate a collective intention to foster and implement holistic and risk-based approaches to generating resilient and sustainable economies and societies. While data availability and capacities to realize this ambition are gradually increasing, activities are also scaling up at international, regional, national and subnational levels and define a direction of travel that will be explored in more detail in Part III. However, it is critical to maintain momentum and continue coordinating global and national efforts in terms of strengthening statistical capacity and reporting moving forward. If those who are furthest behind are to be reached first, a sense of urgency is needed. This should be translated into political leadership, sustained funding and commitment for risk-informed policies supported by accurate, timely, relevant, interoperable and accessible data.

15 (OECD 2018b)
16 (OECD 2017c)
17 (UNISDR 2015f)
18 (UNISDR 2015d)
19 (UNISDR 2015b); (UNISDR 2015c); (UNISDR 2015e)
20 (UNISDR 2015b)
21 (UNISDR 2018b)
22 (WMO 2017)

Chapter 8: Progress in achieving the global targets of the Sendai Framework

The 2018 report of the United Nations Secretary-General on implementation of the Sendai Framework emphasized the vital importance of "a comprehensive overview of progress towards the seven global targets of the Sendai Framework and the disaster risk reduction targets of the Sustainable Development Goals" to guide discussions at the HLPF and Global Platform for DRR in 2019.[23]

The online SFM system is the official Member State reporting mechanism and is complemented by the preparation and release of technical guidance notes. The monitoring system provides an avenue for national reporting on:

- Seven Sendai Framework global targets based on the agreed 38 indicators
- Eleven indicators in three SDG goals, of which UNDRR is the custodian

Monitoring requires significant effort by Member States to collect, enter and validate all data required by the indicators that were agreed by the United Nations General Assembly and the United Nations Statistical Commission.

Using the data from the SFM system, including the disaster loss database complemented with data from other sources, this chapter focuses on a quantitative analysis of the progress made by countries towards the achievement of the global targets of the Sendai Framework (A–G). It does so through a detailed analysis of specific trends, patterns and distribution of selected indicators, based on available data from reporting to date in the online monitoring system. It also introduces the structure of the monitoring system, showcases results achieved and, where possible, data trends, while demonstrating the level of participation and engagement of Member States in the monitoring process.

Cyclone Pam made downfall on Vanuatu (2015), destroying and damaging 15,000 homes
(Source: Silke von Brockhausen/UNDP Vanuatu)

8.1

Sendai Framework Monitoring database

The new online Sendai Framework Monitoring system is a state-of-the-art system built to support all the new indicators, extended hazards types and metadata mechanisms that were recommended by OEIWG and adopted by the United Nations General Assembly. It can be accessed at https://sendaimonitor.unisdr.org.

The related online tool for disaster loss and damage data collection, DesInventar Sendai, accessible at https://www.desinventar.net, was launched on 15 January 2018. The existing databases in the UNDRR public repository of loss and damage data were migrated to also support the requirements of OEIWG. This improved system will enable the collection of detailed disaster loss and damage data at all scales (temporal and spatial) using common methodologies. It also allows the capture of disaster information that is location- and time-stamped, contributing to a strong analysis of disaster loss and damage. Member States were invited to participate in monitoring and to start data-collection processes as soon as possible; the first milestone for data reporting that contributed to the SDG monitoring and reporting was set for 31 March 2018.

23 (United Nations General Assembly 2018)

8.1.1

How the loss data subsystem contributes to data on the global targets

As of the time of writing of this GAR, data is available for 104 countries in DesInventar format. These databases contain detailed locally collected data on disaster losses, enabling a representative view of the way the impact of disasters affects countries. This initiative is an open data and open source initiative, making the information available for governments, affected communities and other stakeholders, including the private sector. Analysis presented in the following sections has been generated based on data from the SFM consolidated loss database.

8.1.2

Member State participation in the monitoring system in 2018

By 31 October 2018, ninety-six countries had started to use the Sendai Framework Monitoring system, out of which 79 were entering global targets data with different levels of progress on each target. Another 16 countries had started defining their institutional settings or entering the socioeconomic data required in the system such as population, GDP, exchange rate and other variables.

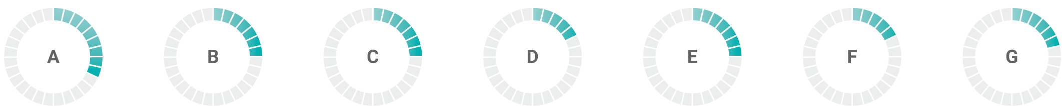
Among those 79 countries that entered indicator data, by far the most commonly reported

Figure 8.1. Progress on global targets, SFM (as of October 2018)

COUNTRY REPORTING OVERVIEW

195	116	67	7	5
countries total	Not started	in progress	ready for validation	validated

TARGET REPORTING OVERVIEW



Mortality	People affected	Economic loss	Critical infrastructure & services	Disaster risk reduction strategies	International cooperation	Early warning and risk information
132 Not started	142 Not started	140 Not started	162 Not started	139 Not started	159 Not started	147 Not started
18 In progress	15 In progress	29 In progress	8 In progress	22 In progress	14 In progress	26 In progress
17 ready for validation	24 ready for validation	13 ready for validation	12 ready for validation	15 ready for validation	15 ready for validation	9 ready for validation
28 validated	14 validated	13 validated	13 validated	19 validated	7 validated	13 validated

(Source: UNDRR, SFM)

target is Target A, on mortality, for which 63 countries supplied data for at least one year. Target B was reported by 53 countries, Targets C and E by 56, Target D by 33, Target G by 48 and Target F by 36.

Within each target, there are also differences in reporting of the different indicators, which reflects the availability of data and collection challenges. The most evident of those is Target F (international cooperation), for which around half the countries reporting were unable to provide data on any of the eight indicators (19 out of 36).

8.1.3

New types of data that may come to the monitoring system in the future

As of July 2018, the Sendai Framework Monitoring system allowed Member States to set up nationally defined and customized targets and indicators, in addition to those already defined and built into the system for the Sendai Framework global targets. There are several important reasons a Member State may wish to do so. Measuring the level of implementation of the Sendai Framework global targets can capture only some aspects of progress in a country. But the Sendai Framework is a complex document that contains a broad set of suggested measures to reduce risk and losses. Countries will need to verify to what extent these recommendations and measures are applicable to their circumstances, and accordingly may want to measure their own level of implementation in a way that informs policy implementation. Furthermore, according to Target E, national DRR strategies should have national "targets, indicators and time frames", and custom indicators that are part of the Sendai Framework Monitoring system.

Member State efforts to define systems of custom targets and indicators are incipient, such that a detailed analysis is not possible. It is expected that, as part of the efforts to reach Target E, Member States will design a variety of custom targets and indicators in national DRR strategies, as suggested by Priority 2 of the Sendai Framework.

8.2

Disaster losses: Sendai Framework Targets A–D

8.2.1

Achievement of Targets A–D: are losses being reduced?

As the development of the reporting system for Member States required extensive expert inputs and consultations, the data collection and reporting period has been brief so far, and the number of countries providing data is too small to provide in-depth trend analysis. The following findings are therefore qualified, but make the best use of available data, including comparison with other data sources.

Two of the targets, mortality (A) and direct economic loss (C), were compared with global data sources. Analysis confirmed that progress found appears to be correct, as data series from all sources present the same trends – despite limitations in the scope and composition of the indicators available in global data sets. Most of the conclusions on the achievement of the first four targets are rather positive, especially when relative values are taken into consideration. As economies grow and the world population increases, more assets and people are exposed, which affects the interpretation of indicators such as the number of deaths or economic losses. Relative values allow inference of more accurate conclusions on the real impacts and magnitude of disasters over time for different people. For example, in absolute terms, richer households may lose more as they have more to lose. Although absolute figures are useful – they offer information on the trends and costs of disasters – they often fail to detail how disasters affect people's lives in the long run. Most important in disaster loss data analysis is the proportion of income or assets lost, as the severity of losses depends on who and how they experienced it.

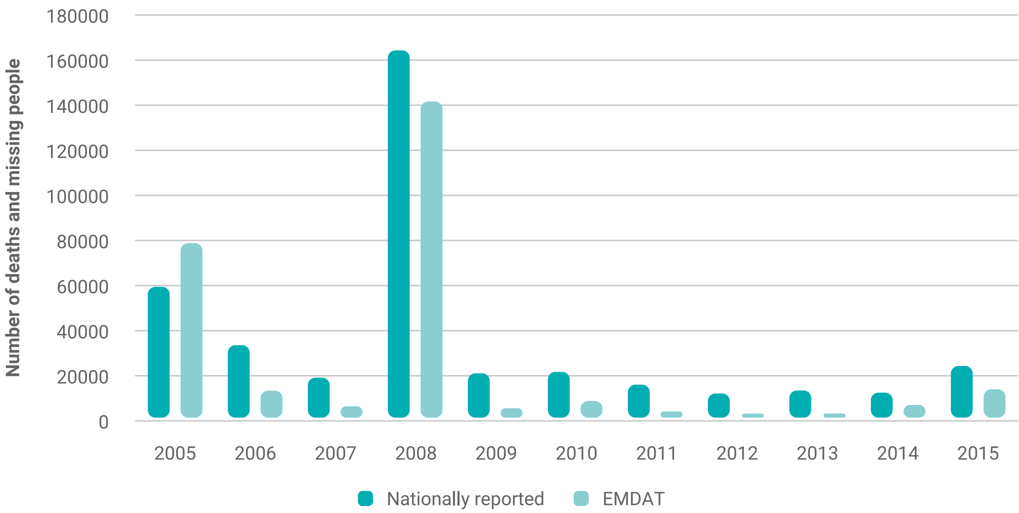
8.2.2

Target A – mortality: a confirmed long-term decline in fatalities relative to population size

The first of the global targets refers to the reduction of mortality attributed to disasters. Mortality is decreasing in absolute and relative terms in the data gathered for the countries participating in the Sendai Framework Monitoring process, as well as in other global data sets.

Ultimately, Targets A and B, mortality and number of people affected by disasters, will require a comparison between the HFA years of 2005–2015 and the final decade of the Sendai Framework of 2020–2030. Only 35 countries have a complete set of data from 2005 to 2017. In 2016 and in 2017, 69 and 81 countries reported mortality data, respectively, but these countries are not the same as the group that has completed the HFA baseline. Therefore, the following preliminary analysis mostly focuses on the 83 countries that completed the HFA baseline and examines the period 2005–2015.

Figure 8.2. Mortality reported nationally in the Sendai Framework Monitoring system and globally in EM-DAT for 83 countries and territories with baseline completed, 2005–2015



(Source: UNDRR with data from DesInventar and EM-DAT)
Note: 2010 appears low due to the absence of Haiti in the sample.

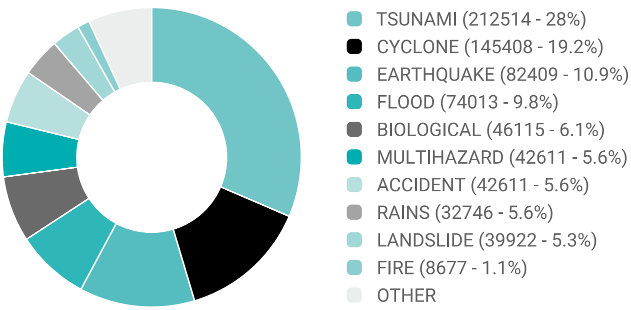
Figure 8.2 reports mortality data from SFM and EM-DAT over the period 2005–2015. Numbers reported by countries in the Sendai Framework Monitoring system are higher than in EM-DAT by an average of 39%, and as much as 300% higher in some years, due to different methodologies applied to the data sets. The thresholds applied by EM-DAT on what constitutes a disaster (at least 10 people killed, 100 affected, declaration of a state of emergency and call for international assistance) mean that many small- and medium-scale disasters are not considered. This difference can be significant, especially for countries not exposed to large-scale hazardous events, or in years where large-scale disasters do not dominate the data.

Global mortality appears to decline from 2005 to 2015 when looking at data reported in both databases (Figure 8.2). Several reasons may account for this. Numerous studies[24] and previous GARs have highlighted this trend and have associated continued economic development and better disaster management with reduced mortality, especially for those types of hazards for which early warning is possible. In addition to better and more available EWSs, which have demonstrated to be effective in hydrometeorological events, Part I discussed the added value of vulnerability analysis and the need to establish metrics for those dimensions of disaster impacts that accrue to the most vulnerable.[25]

While evidence across the globe demonstrates the direct links between resilience and vulnerability reduction, improved data and analysis when moving forward to monitoring the Sendai Framework will be able to better reveal these relationships and inform action and budgeting in the right directions. Other possible explanations of the reduction of mortality is the active work of Member States in reducing the stock of risks, for example the construction of flood defences in many areas of the world, better preparation for large-scale events (including the design of shelters and evacuation facilities) or retrofitting buildings to comply with seismic regulations.

Mortality numbers in the last two decades have continued to be driven by large geological events, accounting for 51% of worldwide mortality (EM-DAT), and 39% of all fatalities in the sample of the SFM baseline in the same period. Other data sources and studies confirm this pattern. There are several possible reasons for this concentration, including that warnings for earthquake events are not possible or not effective, and the enormous size of the current stock of existing risk in buildings and infrastructure that are not earthquake resistant (these are extremely costly and time-consuming to retrofit, despite the efforts of owners and governments and improved and better-enforced construction codes and land-use plans). In addition, tsunami warnings can, in some cases, give enough lead time to save lives, as demonstrated in Japan in 2011. However, a tsunami event killed more than 1,500 people following a 7.5 magnitude earthquake in Palu, Indonesia, in October 2018, with only a 4-minute lead time and a less-effective EWS.

Figure 8.3. Hazard distribution of mortality 1997–2017, for all countries in the Sendai Framework Monitoring system



(Source: UNDRR with data from DesInventar)

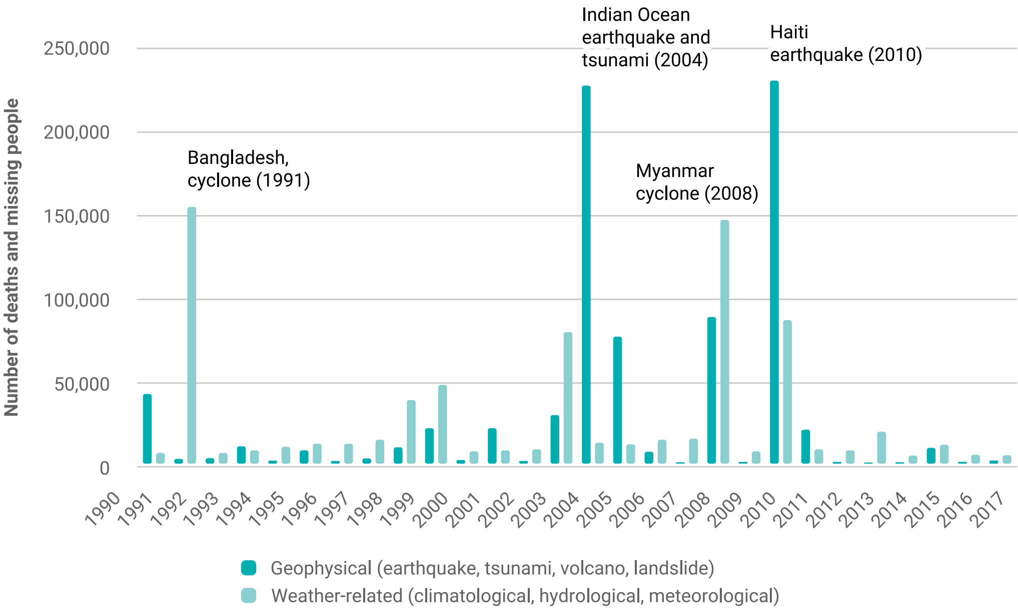
Other patterns previously discovered in the distribution of mortality remain valid. In particular, mortality due to disasters is concentrated in lower-income countries, still accounting for the majority of overall disaster deaths.

Countries with higher relative mortality are concentrated in low- and lower–middle-income groups (Figure 8.4). For example, of the top 20 countries by disaster mortality in proportion to their population for the years 1990–2017, the top five are low- or lower–middle-income countries, and only five are upper–middle income. Haiti, with by far the highest figure of 91.33 deaths per 100,000 population was largely affected by earthquakes, followed by a cholera epidemic in 2010, and storms and floods in 2004. The second-highest figure comes from Myanmar, with a high death toll from cyclones (e.g. Cyclone Nargis), tropical storms, floods and landslides.

24 (Guha-Sapir et al. 2017); (Below and Wallemacq 2018)
25 (UNISDR 2017e); (Walsh and Hallegatte 2019)

A high concentration in intensive disasters can be observed when analysing trends in disaster mortality (Figure 8.4). Nearly half of the total mortality since 1990 is dominated by four big events. The 2005 earthquake in Pakistan accounted for 64% and 93% of global mortality recorded in SFM and EM-DAT, respectively, in 2005. The 2008 cyclone in Myanmar accounted for 85% and 97% of global mortality recorded in SFM and EM-DAT, respectively, in 2008. Although these figures point to an upward trend, this trend is statistically insignificant as it changes arbitrarily subject to the time period chosen and specific intensive disasters in the respective period.

Figure 8.4. Mortality from disasters concentrated in a few intensive events, 1990–2017



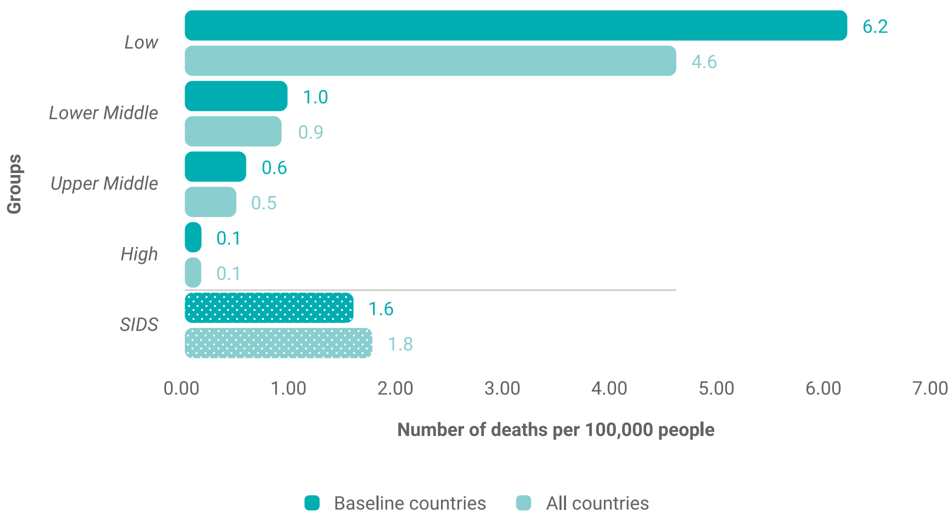
(Source: UNDRR with data from EM-DAT)

As shown in Figure 8.5, which reports data compiled from baseline countries and a sample of all SFM countries, low-income countries are characterized by a much higher number of deaths and missing persons relative to population size than any other income group. Generally, the average ratio of deaths and missing persons to 100,000 people tends to be lower for countries classified in higher-income groups. When compared to income groups, SIDS have, on average, higher ratios than lower–middle-income countries on average. Taking into account that data for SIDS remains largely incomplete, Figures 8.5 and 8.6 may be underestimated.

26 (Samoa 2018)

27 (UNISDR 2015a); (United Nations General Assembly 2017c); (United Nations General Assembly 2014b)

Figure 8.5. **Yearly average number of deaths and missing persons per 100,000 people, income groups and SIDS, 2005–2017**



(Source: UNDRR with data from DesInventar and World Bank)
Note: Baseline countries in the analysis refers to countries that consistently reported data over the period 2005–2015.

SIDS have been repeatedly recognized as a special case requiring intensified attention and funding for sustainable development, in view of their unique characteristics and intrinsic vulnerabilities to environmental and economic shocks. Future disaster losses represent an existential threat for many SIDS.

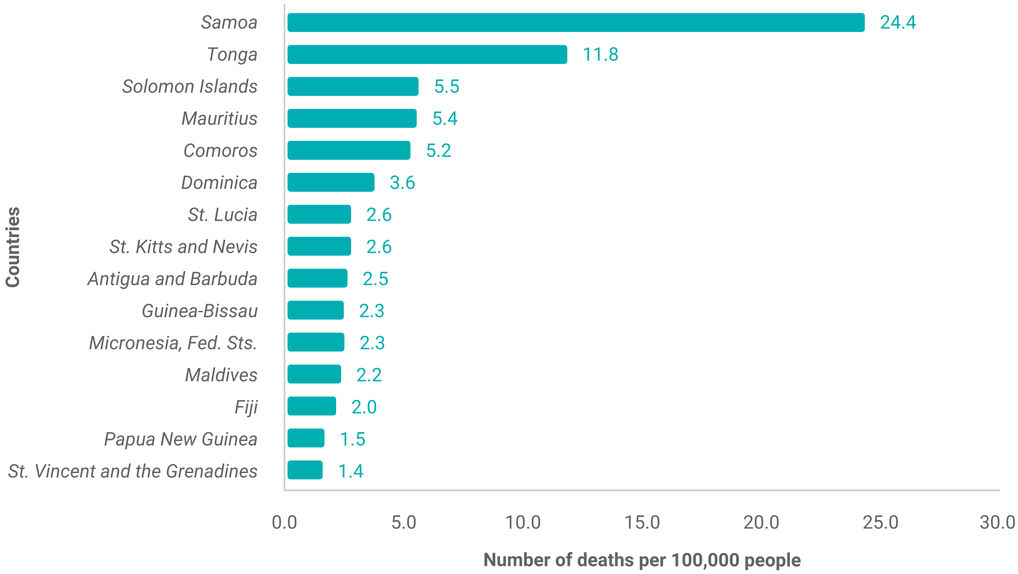
In the midterm review process of the Samoa Pathway, world leaders called for urgent action to address the systemic risks and vulnerabilities SIDS continue to face:

We remain deeply concerned about the escalating devastation already being inflicted on SIDS by the adverse impacts of climate change and…… we reaffirm our solidarity with our members impacted by increased intensity and frequency of natural disasters. We further call for the prevention of new and the reduction of existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political, financial and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery thereby strengthening resilience.[26]

Such vulnerabilities relate to small population size and land masses, spatial dispersion, remoteness, narrow resource and export base, subdued trade growth, high levels of national debt and exposure to global environmental challenges, including a large range of impacts from climate change.[27] In several cases, weak human, technological and institutional capacities, coupled with scarcity of domestic resources and inequality, induce a vicious cycle of low productivity and investment and limited technology transfer.

SIDS are faced with a particular web of challenges making them less able to mobilize and attract the significant amount of necessary finance to implement the 2030 Agenda, as compared to other developing countries. For instance, most SIDS are classified as middle-income countries and do not meet the eligibility criteria for concessional loans from multilateral and bilateral lending institutions, despite their disproportionate exposure to environmental and economic risks. The United Nations, the World Bank, the Commonwealth Secretariat, the Caribbean Development Bank and several other international organizations have established a joint technical working group to study how they can best support countries to gain access to finance on terms and conditions that are appropriate to their circumstances.[28]

Figure 8.6. **SIDS yearly average number of deaths and missing persons per 100,000 people, by country, 2005–2017**



(Sources: UNDRR and the World Bank)

Figure 8.6 shows the yearly average number of deaths and missing persons per 100,000 people in the period 2005–2017, for the top 15 countries with the highest ratios among SIDS. It is evident that disasters represent an existential threat for several SIDS and can derail an island's entire economy. Without tropical cyclones, for instance, the World Bank estimates that Jamaica's economy would be expected to grow by as much as 4% per year. However, over the past 40 years, it has grown 0.8% annually. Similarly, when Hurricane Maria struck Dominica in 2017, it caused damage and losses equivalent to 226% of the country's GDP.[29] Figure 8.7 captures the same ratio, but for groups of country in terms of geographic location. It is observed that Asia and Oceania, followed by Africa, are the regions with the highest number of ratio of deaths and missing persons per 100,000 people.

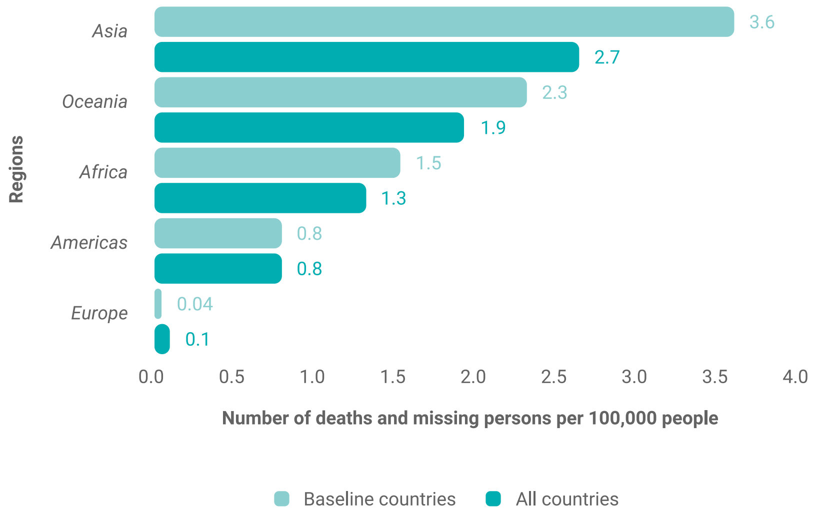
Long-term trends

As previously stated, trends reported in Figure 8.2 based on 11 years of data may have limitations, even though this is the latest available data to inform future measurement of progress towards the target. For example, the reduction in mortality appears to be entirely driven by the higher

28 (Hurley 2017)

29 (Kreisberg et al. 2018)

Figure 8.7. **Yearly average number of deaths and missing persons per 100,000 people, by region, 2005–2017**

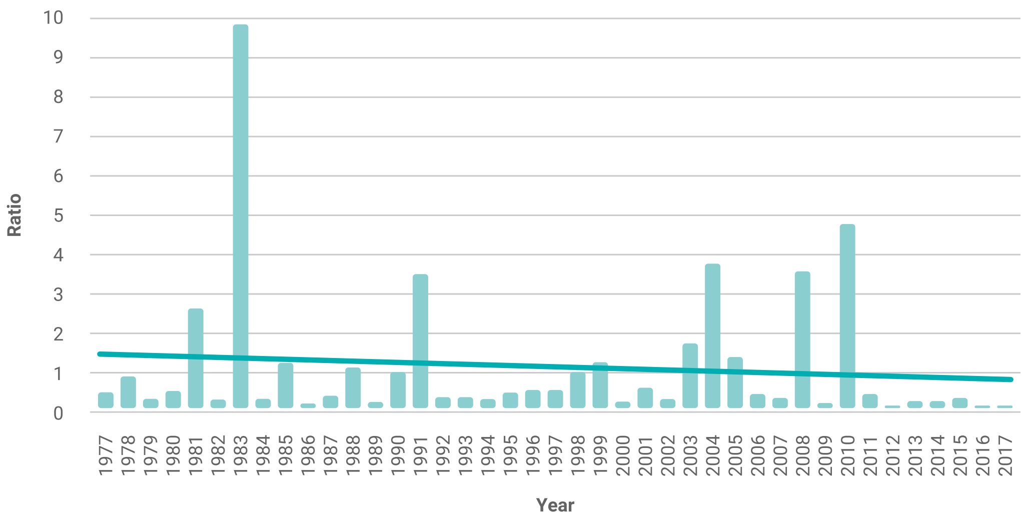


(Source: UNDRR with data from DesInventar)

frequency of large-scale events between 2005 and 2010 compared to the subsequent period, which may not be representative given the short period of time. It could be assumed that the frequency of large-scale events causing high numbers of fatalities is the real driver of trends in global mortality in the short term. Therefore, longer periods of time are required to draw clearer conclusions.

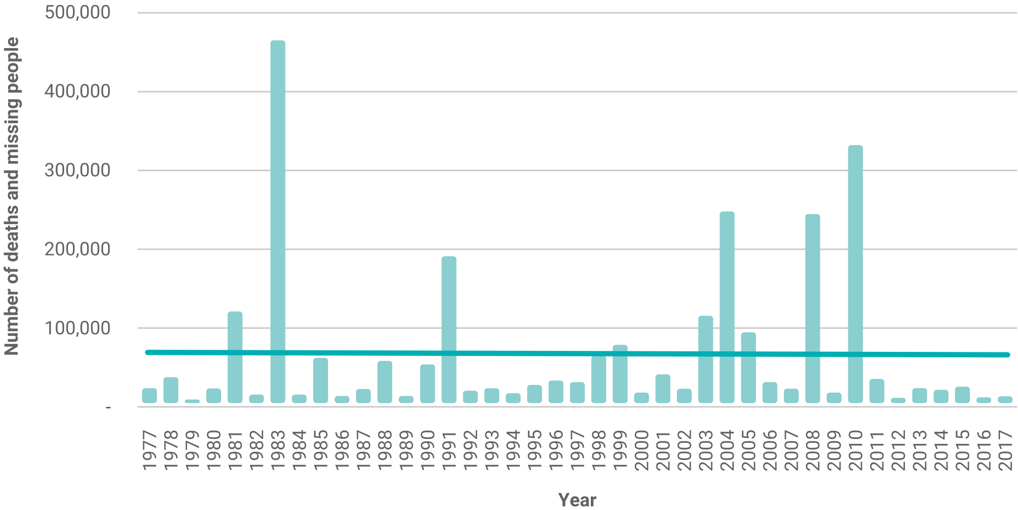
Figure 8.8 thus examines a 41-year period using EM-DAT data. The downward-sloping fitted line shows that the ratio of deaths to 100,000 people

Figure 8.8. **Relative global mortality per 100,000 population), 1977–2017**



(Sources: EM-DAT, United Nations statistics, processed by UNDRR)

Figure 8.9. Absolute global mortality (EM-DAT), 1977–2017

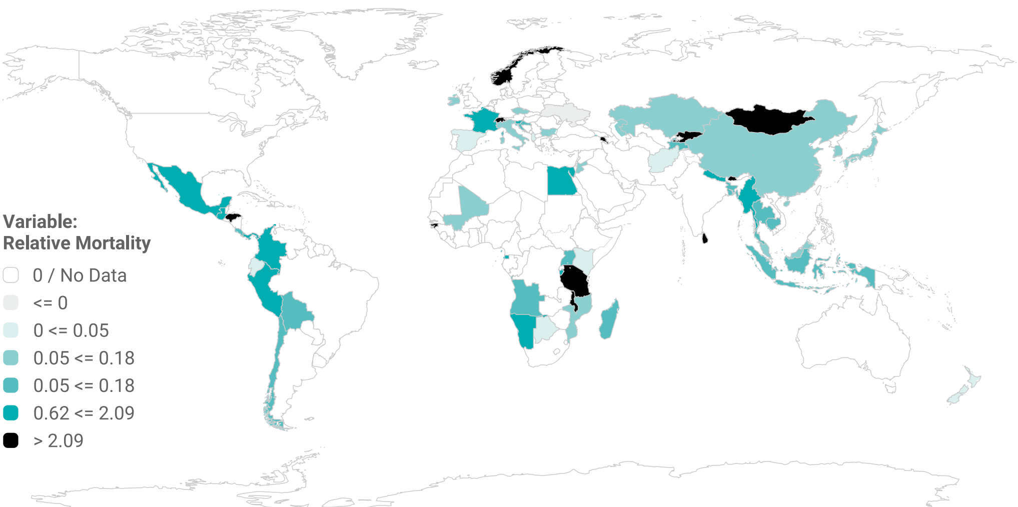


(Sources: EM-DAT, United Nations statistics, processed by UNDRR)

has declined from 1977 to 2017. The yearly average of the ratio of deaths to 100,000 people was 1.56 for the period 1977–1996 and dropped to 1.08 for 1997–2017.

In SFM, the average of number of deaths and missing persons attributed to disasters, per 100,000 people (Indicator A-1), or other relative indicators such as number of people affected by disaster per

Figure 8.10. Indicator A-1, mortality by 100,000 people with data for 2017 from 81 Sendai Framework Monitoring system countries



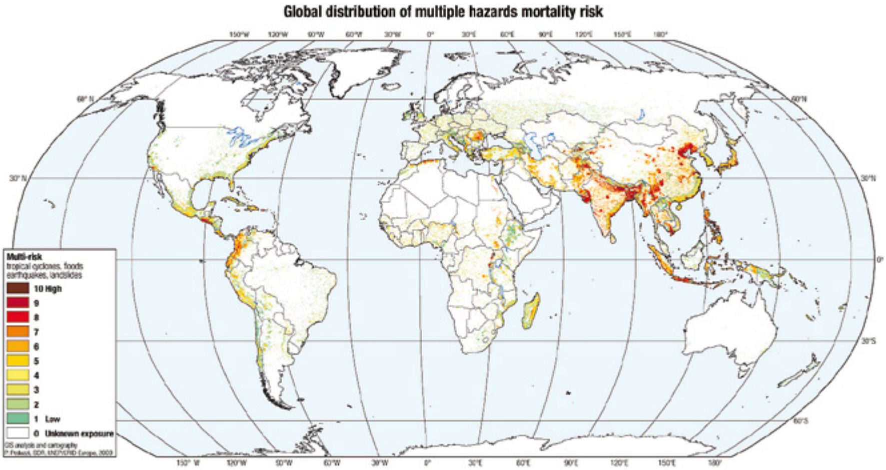
(Source: UNDRR)

Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

100,000 (Indicator B-1), or direct economic loss in relation to GDP (Indicator C-1) for each country over the reporting period, could be seen as a risk map if a long enough history of losses and population could be gathered (Figure 8.10). So far, there is insufficient data for these maps to be produced with a high statistical confidence. If Member States continue monitoring the Sendai Framework, data for a map like this would become enriched and eventually could offer useful insights as to the advancement in the implementation, progress and impact of the Sendai Framework.

GAR09 featured a multi-hazard (major natural hazards) map of the world. Abstracting the empty areas of the world in the Sendai Framework Monitoring system data, there is a good resemblance between the map of relative mortality (A-1) and the GAR09 mortality risk map.

Figure 8.11. Mortality risk index, global risk assessment – GAR09



(Source: UNDRR)

Disclaimer: The boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Countries that build and maintain detailed loss databases could use this technique to produce proxy risk maps, which can be useful representations of recurrent and localized hazards such as weather-related or biological hazards, even at a low level of resolution. Earthquakes, tsunamis and other less-frequent hazards cannot be represented with such tools, neither would they replace mathematical modelling of the type conducted by risk researchers. They would be limited by the degree of resolution possible from available data, but they provide a powerful means of validating models with direct data of experienced losses.

8.2.3

Target B – people affected

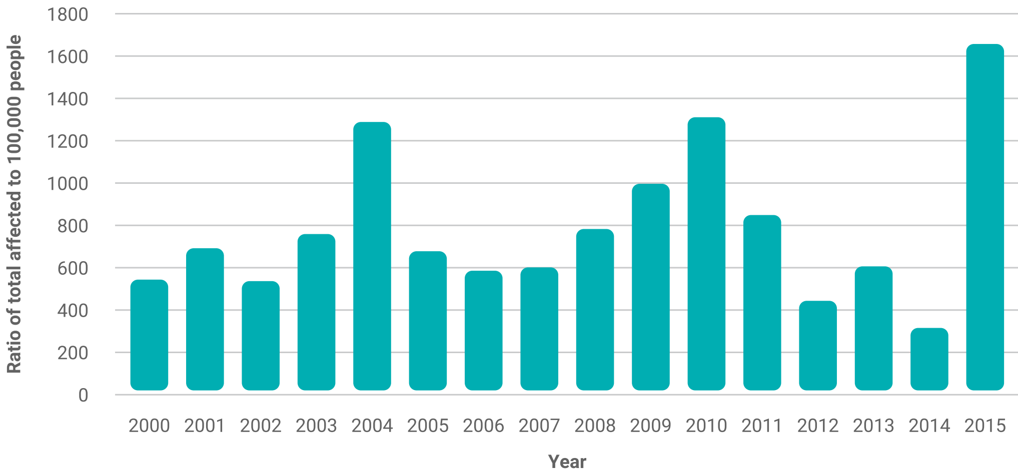
A proxy for the number of people directly affected by disaster can be made through: (a) the number of people who require medical attention (injured or ill), (b) those who are living in dwellings damaged or destroyed by disasters and (c) those whose livelihoods are affected. While some double counting will occur (e.g. those injured and living in affected dwellings), the main objective of this proxy is to verify trends. Consequently, it aims to measure the achievement of the target on the basis that if these numbers grow, then the total number of people affected must be growing, and vice versa. If this proxy measure trends downwards, it would be safe to assume the total number of affected people was decreasing.

Application of these methodologies requires important data. Each indicator for the relative number of people affected by disasters in a country faces challenges, especially the determination of the number of those whose livelihoods were affected. Targets A and B of the Sendai Framework require dividing loss data by population, so that the numbers are relative to population and therefore more comparable with each other within a country, and among countries.

For this GAR, good data was available for the first five indicators of Target B: relative number affected in the population (B-1), ill or injured people (B-2) and damaged and/or destroyed dwellings (B-3, B-4 and B-5). However, for the livelihoods indicator (B-6), it was possible to estimate the number of workers associated with losses in agriculture only, not in other sectors. As more countries report in the monitoring system, including better reporting on productive assets lost (Indicators C-2 and C-3), these indicators will be able to account for more of the affected people.

Figure 8.12 shows the calculated number of affected people relative to population size over 16 years. Data from 83 countries that had highly consistent reporting for 2000–2015 is shown. No clear trend emerges from the figure, and high ratios must be treated with caution – for instance, 2015 is dominated by the earthquake in Nepal and fewer countries reported data for this year.

Figure 8.12. Indicator B-1a, number of people affected, in SFM 83 countries with 2000–2015 data



(Source: UNDRR data)

This contrasts with Target A, where relative trends are showing a decrease in mortality. This may be a reflection of the good results on reducing mortality risk, achieved with preventive measures such as evacuations, better EWSs and less vulnerability in many exposed elements, most notably in the housing sector (Figure 8.20, showing the trend of relative losses in this sector). However, other impacts that are included in the calculation of affected people, including injuries and disruption of livelihoods, especially agriculture, and the economics of the associated damage seem to be growing in contrast to the decrease in mortality.

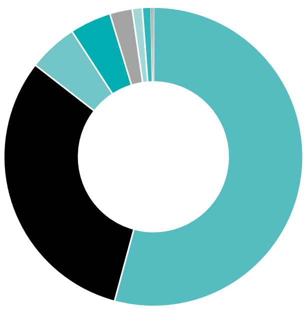
People affected and systemic risks – the face of displacement

As demonstrated throughout this GAR, a single unavoidable natural event may trigger preventable repercussions across sectors and systems that expand the breadth, duration, scale and size of adverse consequences. These negative impacts may come in the form of internal and cross-border population movements, preventable business disruption, economic distress, social unrest, hunger, poverty and diseases, to name just a few.

Over the period 2008–2018, disasters stemming from natural hazards have displaced an average of 23.9 million people each year.[30] Disasters, which are the main triggers of forced displacement recorded – show no signs of abating.[31] People choose to respond to disaster impacts with a web of in situ and ex situ strategies, including mobility. They may flee to other areas within their country or cross borders[32] in search for a safer and less exposed place. Other forms of human mobility – including forced displacement, voluntary migration and planned relocation – are occurring in response to hazards and environmental degradation, or in anticipation of those. Economic motives pay a key role as push and pull factors shaping migration paths from rural to urban centres.

On a global scale, the Internal Displacement Monitoring Centre (IDMC) counted 17.2 million people as newly internally displaced due to climate-related disasters and natural hazards in 2018. Displacement in the context of disasters is a global and increasingly alarming reality. According to the UNHCR Protection and Return Monitoring Network, around 883,000 new internal displacements were recorded between January and December 2018, of which 32% were associated with flooding and 29% with drought. Many more people are believed to be on the move, resulting from the slow-onset effects of climate change and environmental degradation.[33] The effects of climate change are predicted to increase the irregularity and intensity of extreme weather events, as well as to drive slow-onset disaster displacement risk through exacerbating existing natural resource scarcity such as water stress. The situation in Yemen, one of the world's most severely water-stressed countries, is a clear example and reminder of the face of displacement over dwindling resources.

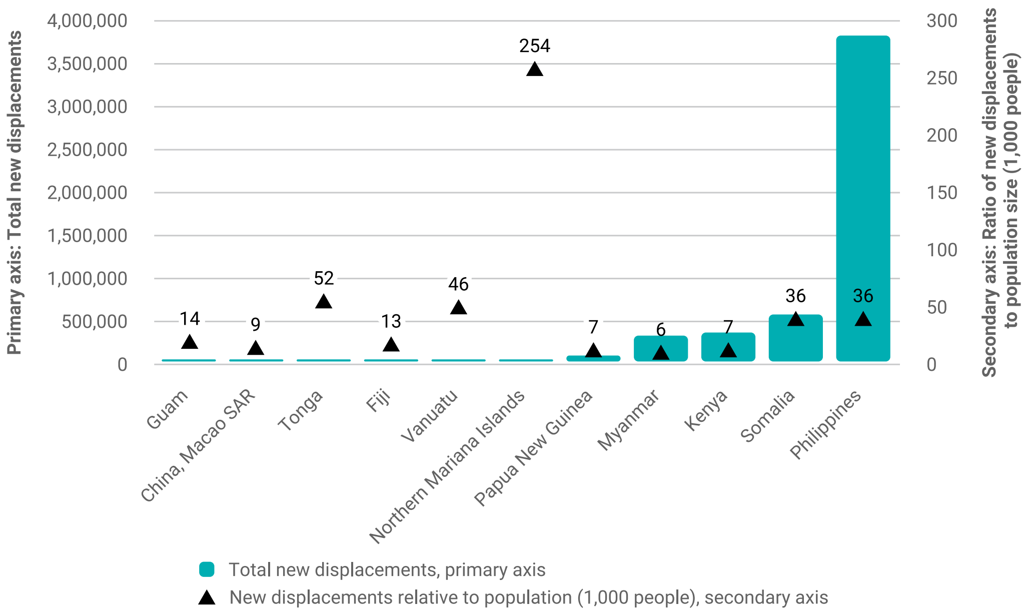
Figure 8.13. Disaster-related new displacements by hazard category



(Source: IDMC data 2019)

30 (Irish Red Cross 2018)
31 (Internal Displacement Monitoring Centre 2017)
32 (The Nansen Initiative 2015)
33 (Internal Displacement Monitoring Centre 2018)

Figure 8.14. Total new displacements in absolute and relative terms, 2018

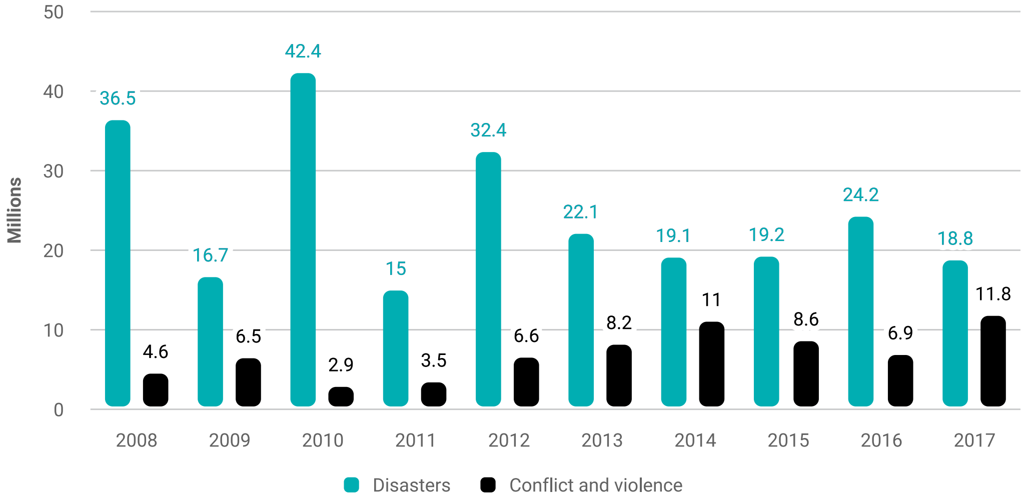


(Source: UNDRR with data from IDMC 2019)

In an increasingly interconnected and interdependent world, displacement may exacerbate vulnerabilities by exposing people to new risks and challenges such as inequality, climate change, poverty, under/unemployment and fast-paced urbanization. Fleeing home to escape the impacts of a hazard is often a decision between life and death. But disaster displacement – which includes evacuation and, in some cases, planned relocation following environmental stressors – often has severe and long-lasting social, economic and legal impacts, particularly in protracted contexts.[34] Climate change effects and poor natural resource management, leading to the gradual erosion of livelihoods, are often decisive factors for alternative household strategies, to diversify risks of environmental stressors and disaster impacts. Fast-paced and unplanned urbanization comes with new risks. Employment opportunities for IDPs are often confined to poor-quality daily labour, which has a negative impact on household budgets, savings and spending, and compounds IDP ability to further manage risks and cope with negative shocks.[35] In addition, IDPs are often obliged to settle in high-risk areas – such as floodplains, subsiding land or hillside slopes – which are less controlled and often the most affordable yet hazard-prone areas. This further increases the likelihood of secondary displacement risk.[36]

The Sendai Framework pays due attention to the systemic complexities of population movements as drivers of risk, but also as opportunities for strengthened resilience. It highlights consequences of disasters in terms of displacement, but equally acknowledges the contributions that migrants can make – through remittances, networks, skills and investments – in addressing root causes and promoting resilience. The relationship between DRR and disaster displacement has also been recognized by the Global Compact on Migration, aiming to mitigate the adverse drivers and structural factors that hinder people from building and maintaining sustainable livelihoods.

Figure 8.15. **New displacements due to disasters and conflict, 2008–2017**



(Source: IDMC data 2018)

However, Figures 8.13–8.15 demonstrate that advancements in the development of global normative frameworks and policies have not been matched by implementation and adequate investment in preventing and addressing disaster-induced displacement challenges.[37] Without scaled-up action to reduce risk and strengthen resilience, vulnerability and exposure will continue contributing to driving disaster risks upwards over the years to come.[38]

8.2.4

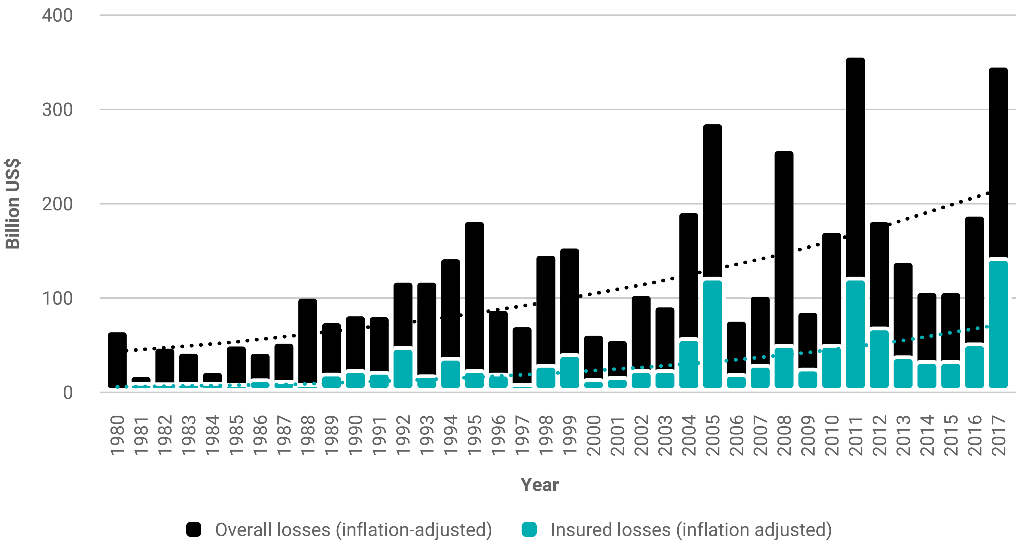
Target C – direct economic loss

Absolute and relative loss data

For a long time, statements such as "losses are growing exponentially" and "rising losses reached unprecedented levels" have dictated discussions of economic losses due to disaster. These estimates are useful for indicating the "stocktake" of average losses. Figure 8.16 demonstrates that overall losses and insured losses, adjusted to take into account inflation, significantly increased from 1980 to 2017. However, these figures fail to determine and provide finer detail on how disaster losses affect people's lives.

34 (UNISDR 2018a)
35 (Santos and Leitmann 2016)
36 (UNISDR 2014)
37 (Internal Displacement Monitoring Centre 2018)
38 (UNISDR 2015a)

Figure 8.16. **Overall and insured disaster losses, 1980–2017**



(Source: UNDRR with data from Munich Re)

A somewhat different picture emerges from several studies that examined economic losses by relating the data to the size of the population or the economy. This approach looks at losses relative to exposure, be it size of population, GDP, capital stock, etc., as well as changes in the size and shape of the economy driven by forces such as inflation and wealth growth.[39]

The Sendai Framework mandates a certain type of methodology for economic loss data by stating that Target C is to be the reduction of direct disaster economic loss in relation to global GDP by 2030. When figures of losses are divided by GDP, a different perspective on relative damage emerges, as shown later in this section.

Increases in the level of recorded loss in current data may occur because the monetary value of the exposed elements is higher and because more of these valuable assets are exposed. These factors should not be confused with higher risk. Individual assets have a specific level of risk, which is independent of the value of the asset, and is independent of the existence of other assets also being exposed. Dividing losses by GDP also reflects better the changing levels of risk.

Using the available date, the following sections measure the extent to which Target C is being achieved by participating countries, and show the behaviour of economic losses. As with the case of mortality, there is a group of countries that has complete data for the years of the baseline (2005–2015), and a different set of countries that reported only for 2016 and 2017. This hampers the possibility of a full-period consistent analysis.

It is also important to recall that Target C does not explicitly set a minimum period of data to be analysed. If the results being monitored are to correspond to those of the Sendai Framework period, then waiting until year 2030 to analyse trends between 2015 and 2030 could be too late. However, the work of countries on reducing risk did not start in 2015. The HFA period should also be taken into account, and even some years before the two frameworks (a period when DRR was less high in

39 (Barthel and Neumayer 2012); (Barredo 2009)
40 (Zapata Martí and Madrigal 2009)

government agendas), to obtain the trends that can demonstrate the effectiveness of the actions recommended in both frameworks.

Data and methodology for economic loss assessment

Economic model

The economic model built for the Sendai Framework Monitoring to assess direct economic losses caused by disasters is under development. It started from concepts and methods of more detailed and refined models such as the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) methodology, but was simplified to respond to the challenge of evaluating hundreds or thousands of events around the globe[40] that did not have a proper economic assessment of economic damage in the field and improved with the development of the technical guidance notes for targets and indicators.

The methodologies proposed for SFM started with simplified versions developed for GARs. The number of items considered has increased, from just a few in GAR11, adding generic crops and livestock in GAR15, to today's list of over 200 variables. Though the proposed set of methodologies is relatively simple, the lack of available information needed for many indicators has made this a challenging analytical task. However, as more countries report aggregated and disaggregated data, the outcome will become a better and more realistic economic loss model that can be used to assess present and past disaster losses.

Agriculture

The Food and Agriculture Organization of the United Nations (FAO) developed, jointly with UNDRR, a revised methodology for the estimation of losses in the agricultural sector. This makes extensive use of national agricultural statistics, including planted area, yields by crops and other information specific to the sector. The economic impact of disasters on the agricultural sector has been divided into several subsectors (crops, livestock, forest, aquaculture, fisheries, stocks and assets) to better reflect the different particularities of each. In the case of

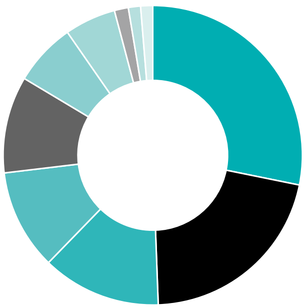
Reducing risk and vulnerability to climate change in the region of La Depresión Momposina in Colombia
(Source: UNDP Colombia)

agricultural crops and animal produce, the values countries are requested to report on – hectares and number of animals, respectively – must be transformed to match the units of the available economic value. This is possible to calculate when enough data is available. For example, for a particular year and crop, the number of lost hectares is multiplied by the expected yield by the average value per tonne.

Unfortunately, information on prices and yields is not always locally available for all countries, crops and years. In many cases, data can be drawn from FAOSTAT information, but there will still be important data gaps. To fill these, regional clusters of prices are estimated based on similar GDP per capita (GDPPC). When any country has missing information, the respective cluster data is used. In extreme cases, the world average must be used. In the case of animal product, a similar logic is followed, with the only difference being the yield, for which an international effective weight average has been provided by FAO statistical offices. Another particularity occurs when disaggregation has not been provided, that is, when crop and livestock have not been individually reported. In this case, a weighted average is calculated based on the available area harvested and the crop prices.

Despite possible data gaps, the triangulation of sources possible through the SFM functionality enables broad analyses of agricultural sector disaster losses, such as in Figure 17.

Figure 8.17. Direct agricultural losses by hazard type, 2005–2015



(Source: UNDRR, SFM reported by 83 countries, March 2018 data, in constant 2010 $)

Productive assets and housing sector

SFM implements a basic methodology to assess the economic value of built elements as described in the technical guidance notes. This methodology assigns a value of a built element (e.g. a house or school, or a building in general) based on construction costs (expressed per square metre), the average size of the building, an overhead to account for the contents of the building (furniture, appliances and equipment) and another to account for the associated physical infrastructure (urban and network infrastructure such as driveways, sewerage, water and electricity connections).

Value= Number of assets × average asset size × construction cost per M^2 × equipment ratio × infrastructure ratio

For the practical implementation of the methodology, a database of costs for an important number of types of assets has been prepared based on the International Standard Industrial Classification of all economic activities (ISIC, Rev. 4).[41] This list contains items for almost all types of buildings corresponding to major economic sectors, leaving it to the discretion of each country to add more specific classes, and to refine the construction prices initially proposed.

Following analysis advanced in GAR13 and GAR15, the housing sector is initially assessed using the concept of social housing units (i.e. the default economic assessment estimates the cost of houses using as its average the size of social housing units required to provide basic shelter to the families in need). This average size can be modified by countries to obtain a more accurate and contextualized value. In a similar fashion, sizes for educational and health facilities are initially set as the size of small facilities of each type, thus providing a conservative estimate of value. Similarly, as with procedures used in agricultural losses, the methodology makes use of the clustering of country data by GDPPC to obtain a construction value per unit area in countries where no data was found.

Member States can modify all of the provided parameters for each item, based on regional or national preferences, such as the average area of the assets, the construction costs per type of asset, the percentage of equipment in relation to construction cost, the percentage of related infrastructure in relation to construction cost and the average repair cost damage ratio of damaged assets. This provides an extremely flexible tool that is fully adjustable to the context of each country.

Critical infrastructure

The OEIWG report on terminology related to DRR defines critical infrastructure as the physical structures, facilities, networks and other assets that provide services that are essential to the social and economic functioning of a community or society. The types of assets listed under the section "Proposed UNDRR Classification of Infrastructure sector", given in the technical guidance notes for Target D as critical infrastructure, cover a wide scope of facilities and networks. They include health centres, hospitals and educational facilities, as required by the target itself, and also specific structures in other sectors such as power plants, government facilities, transportation networks, and water, sewerage and solid waste treatment facilities. Critical infrastructure buildings (e.g. health and education facilities) are assessed in a similar fashion to the productive assets described in the previous section, although their role as critical service providers is accounted for differently under Target D.

The technical guidance notes methodology has simple recommendations for the economic assessment of linear networks, in particular for roads. The methodology is based on either the cost to build a linear unit (metre) of the network or the cost of rehabilitation of the same. In the case of roads, default conservative values for rehabilitation and reconstruction of unpaved and single lane paved roads are provided, based on data and statistics of the World Bank.

The types of assets listed also include more specific structures such as power plants and water treatment facilities. No default values are provided for these items, given their enormous variability, which must be priced specifically for each country. This is particularly important as each one of these types of asset is subject to local regulations, and is bounded by unique regional geographic, climatic and environmental characteristics.

Cultural heritage

Cultural heritage sites relate to monuments, traditions and places of worship, and also to the affected communities whose identity, culture and livelihoods are directly linked with those sites. Cultural heritages vary vastly within and among countries, which makes standardized methodologies to assign economic value challenging. Most losses associated with cultural heritage are intangible losses (i.e. those associated with the historical and/or artistic value of cultural heritage assets). Also, a good part of economic losses associated with cultural assets are indirect losses, mainly connected to future income losses associated with tourism, culture and recreation.

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41 (UN DESA 2008)

However, to calculate at least a portion of the direct economic loss, it is suggested that Member States report the cost of rehabilitating, recovering and restoring the assets to a standard similar to that of the pre-disaster situation. This is feasible for fixed assets (buildings, monuments and fixed infrastructure of cultural heritage assets) and for movable assets such as paintings, documentation and sculptures. When cultural assets are totally lost, economic assessment is extremely difficult, as there is simply no way to assign the value of what is recognized as priceless cultural artefacts. In some cases (and whenever available), the inflation-adjusted acquisition price or market value of movable cultural heritage destroyed or totally lost can be used, as can the cost of building replicas of these assets.

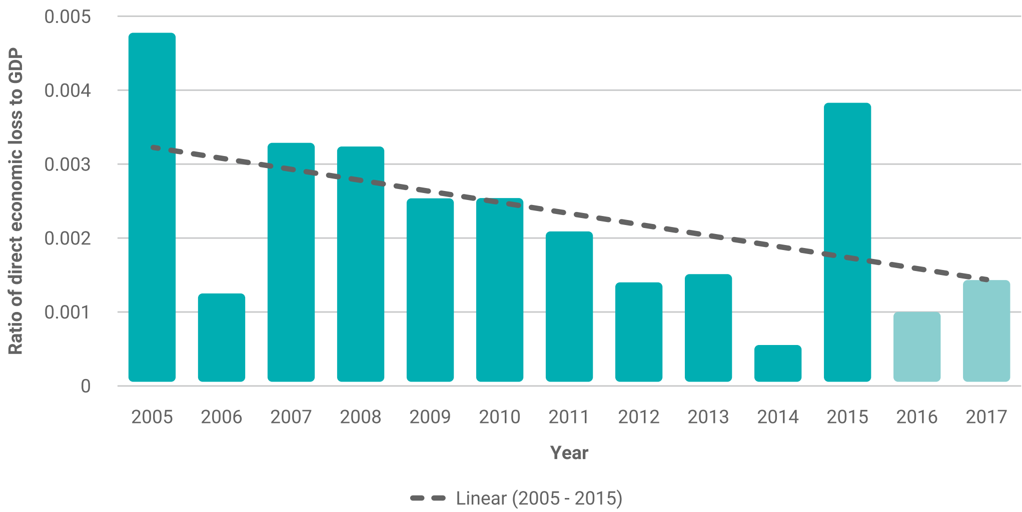
Trends and figures of economic loss

Relative loss is presented in Figure 8.18, where each year contains the sum of losses from all 83 countries, divided by the sum of GDPs of all the same 83 countries. As GDP is often expected to increase from one year to the next, the net result in the baseline period of 2005–2015, which corresponds with HFA, is a steep trend downwards. This apparently demonstrates that countries were doing well reducing risk during that period, as it shows a reduction in economic losses from disasters in relation to GDP. But, as noted above, outliers are key in the analysis of trends (see Box 9.1). In any time series with loss values, the location of the outliers (in this case, large-scale disasters) can completely change the trend. Furthermore, with such a short time series, adding one year before or after could similarly disrupt the trend line.

It is well known that 2017 was particularly disruptive in terms of economic loss. According to Swiss Re, it broke several records:[42]

- Total global economic losses from natural hazards and man-made catastrophes were $337 billion in 2017
- Global insured losses from disaster events in 2017 were $144 billion – the highest ever recorded
- Hurricanes Harvey, Irma and Maria resulted in combined insured losses of $92 billion, equal to 0.5% of GDP in the United States of America

Figure 8.18. Indicator C-1, direct economic loss relative to GDP, 83 countries with baseline in SFM, 2005–2017



(Source: UNDRR data)

- Insured losses from all wildfires in the world totalled $14 billion in 2017, the highest ever in a single year
- More than 11,000 people died or went missing in disaster events in 2017

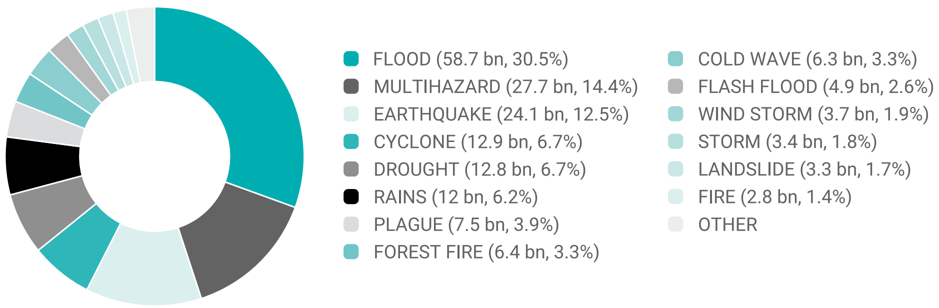
Unfortunately, the data sample in the monitoring system has different countries reporting for 2016 and 2017 than for the baseline years 2005–2015. Also, in 2011 and 2017, most losses occurred in the United States of America, which is not included in the sample of reporting countries. Nevertheless, including 2016 and 2017 in the relative loss calculations still does not alter the downward trend in economic losses.

Hazard distribution of economic damage

Different hazards affect exposed assets in different ways. In the following paragraphs, due to data limitations, only the total loss, losses to agriculture and losses in the housing sector are presented. Agriculture and housing are the two sectors for which highest losses have been reported among all sectors.

Figure 8.19 shows that weather-related hazards are the cause of most economic loss, with floods as the costliest hazard, bearing 30.5% of all losses, followed by multihazard events and earthquakes with 12.5%. Notable in the extended data set compliant with the Sendai Framework is the appearance, in seventh place, of a biological hazard (epidemic).

Figure 8.19. Distribution of total economic loss (constant 2010 $) in 83 countries by hazard, 2005–2015



(Source: UNDRR data)

Housing sector damage is dominated by the same three hazards (floods, earthquakes and cyclones). Despite the housing sector being one of the most affected and critical sectors for populations, available data about the global impact of disasters in the housing sector is scarce and scattered among many sources.

Using the data from SFM, the importance of the housing sector is apparent. In the sample of 83 countries for the period 2005–2015, losses in the housing sector represented 62% of all economic losses. While the proportional size of housing losses may reduce when better data on other sectors and more countries is available, it is nevertheless representative of the importance of this sector. For the year 2017 alone, when a different set of 81 countries (including China and a large group

42 (Swiss Re 2019)

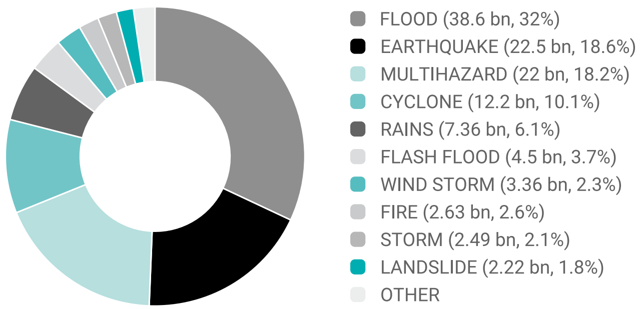
of developed countries) reported, the weight of the sector was similar: 60.65%.

National disaster loss databases, and more recently SFM, are allowing Member States to collect detailed data in these and other economic sectors. Data on the housing sector is important during emergency response (e.g. for calculation of shelter needs and affected population) and is an important input in risk assessments, which may use loss data as a calibration point.

Identifying patterns and trends of damage in the housing sector is crucial in policymaking, given that most populations, especially the poor, are affected by their houses, which are the shelter they depend on and also the place where livelihoods are anchored. Additional factors underlining the importance of the housing sector are: the understanding of risk in cities, which are particularly vulnerable due to rapid and chaotic urbanization; the uneven concentration of economic wealth in cities, rendering large segments of the population with high levels of vulnerability; the expansion of slums (often into hazardous locations); and the failure of urban authorities to enforce building codes and land-use planning.

The OEIWG report noted that data on housing damage, along with data about who live in those houses, will be used in the indicators to measure the achievement of Target B, the reduction of number of affected people. As with other data requirements, it is up to Member States to meet the challenge of properly accounting for this data. This will ultimately be a beneficial asset in the hands of those in charge of reducing risk through evidence-based information.

Figure 8.20. Housing sector losses (constant 2010 $) in 83 countries by hazard, 2005–2015



(Source: UNDRR data)

Agricultural losses mostly driven by floods, droughts and biological hazards

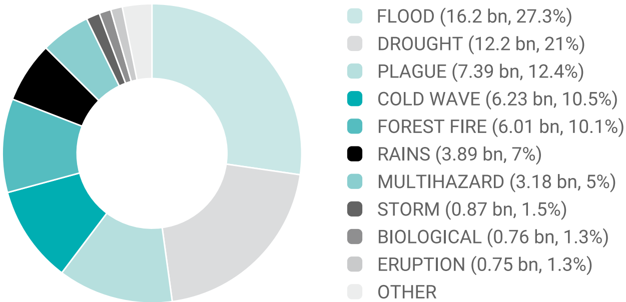
Agricultural losses are mostly driven by floods, droughts and biological hazards in the 83 countries of the sample with baseline data.

A 2017 report from FAO on the impact of disasters in this sector recognizes that impacts on agriculture "are seldom quantified or analysed in depth, yet agriculture tends to be one of the main economic activities in developing countries, contributing on average between 10 and 20 percent of national GDP in lower-middle-income countries and over 30 percent in low-income countries".[43] The same report, and after a review of 74 PDNAs, found that losses in the agriculture sector represent 23% of all loss attributed to medium- to large-scale disasters and 26% of losses due to climate-related hazards, stating that "Almost one third of all disaster loss is accrued in the agricultural sectors." The data in the 83-country baseline is consistent with this figure, showing 31% of losses are in the agricultural sector.

The FAO report and the data of the sample concur in that the most damaging hazards are droughts and floods. However, the relative size of damage by drought in the FAO report is much bigger, reaching more than 83% of the total. This disparity results from limitations of data and the lack of countries highly affected by drought in the 83 countries in the baseline sample. Many of the drought-affected countries of Africa, the Americas and other continents do not actively report losses to SFM and are not part of the group of countries that have completed their baseline data (2005–2015). These data gaps will reduce as Member States proactively monitor and account for their losses.

Another difference comes from the accounting of extensive risk. FAO data is from PDNAs, which are conducted only for large-scale disasters, most of which have been droughts in the past few years. Considering extensive risk impacts (small- and medium-scale disasters) would likely change the final composition due to hazards of agricultural damage.

Figure 8.21. Agricultural losses (in constant 2010 $) in 83 countries by hazard, 2005–2015



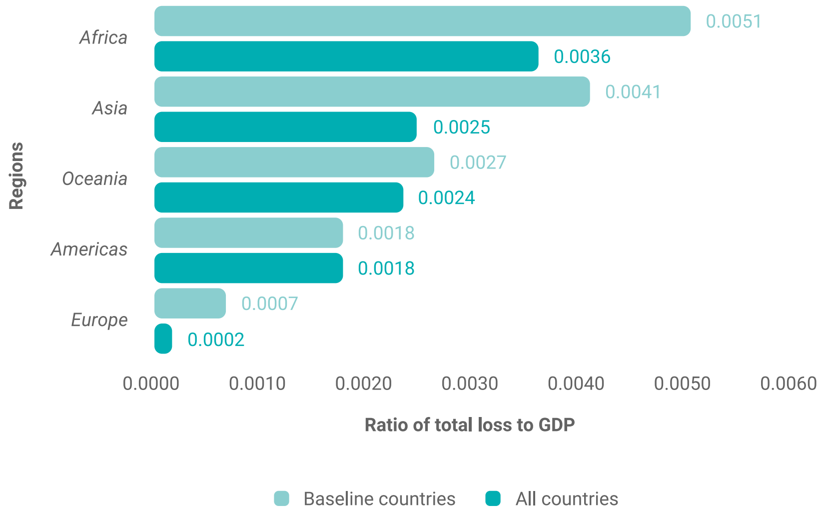
(Source: UNDRR data)

Regional distribution of economic damage and analysis by income group

In terms of geographic distribution of relative to GDP loss over the period 2005–2017 (Figure 8.22), Asia and Africa continue to outpace others, demonstrating the gravity and magnitude of the impact of disasters in comparison with other regions. For example, ESCAP reports that between 1970 and 2016, Asia and the Pacific lost $1.3 trillion in assets.[44] A significant part of those losses was the result of floods, storms, droughts and earthquakes including tsunamis. Forecasts for the future are equally alarming with 40% of global economic losses from disasters being projected to be in Asia and the Pacific, with the greatest losses in the largest economies: Japan and China, followed by the Republic of Korea and India. Yet, when analysing those figures as a proportion of GDP, the burden is disproportionately high in countries with special needs, in particular SIDS, which are forecasted to have average annual losses close to 4% of their GDPs.[45] The impact in terms of losses and deaths is probably much higher than the data suggests, as disasters in several of these countries remain underreported.

43 (FAO 2017c)
44 (UNESCAP 2017)
45 (ESCAP 2017a)

Figure 8.22. Yearly average total loss relative to GDP, by region, 2005–2017



(Sources: UNDRR and World Bank)

While disaster risks are widespread throughout the Asia and Pacific region, analysis points to cross-border hotspots where higher likelihood of change coincides with high concentrations of exposure and vulnerability, and thus impact.[46] For example, river deltas such as the Mekong and the Ganges–Brahmaputra–Meghna deltas will be affected by sea-level rise due to subsidence, deteriorating water quality, decreases in sediment supply and increases in groundwater salinity.

In terms of regional cooperation in DRR, the Asia and Pacific region has been particularly active in improving collective disaster preparedness and exchanging good practices on building back better. The ASEAN Humanitarian Assistance Centre in Indonesia is actively promoting regional cooperation by providing policy advice, research, strategic learning and exchange of information for effective DRR. In addition, within the existing regional groupings such as ASEAN, there has been growing emphasis on conducting joint exercises for improved disaster preparedness through strengthened risk management capacities and enhancing the resilience of critical infrastructure against natural hazards with cross-border spillover effects. Post-disaster recovery programmes have also been used often as opportunities for exchange of good practices, particularly in housing reconstruction. ESCAP has established a Regional Trust Fund on Tsunami, Disaster and Climate Preparedness, which could be used as an effective vehicle for sharing data, tools and expertise to support disaster resilience in high-risk countries of the Asia and Pacific region. ESCAP has also recently established the Asian and Pacific Centre for the Development of Disaster Information Management to provide member countries with advisory services and technical cooperation on transboundary disasters such as earthquakes, droughts, sandstorm and dust-storms.

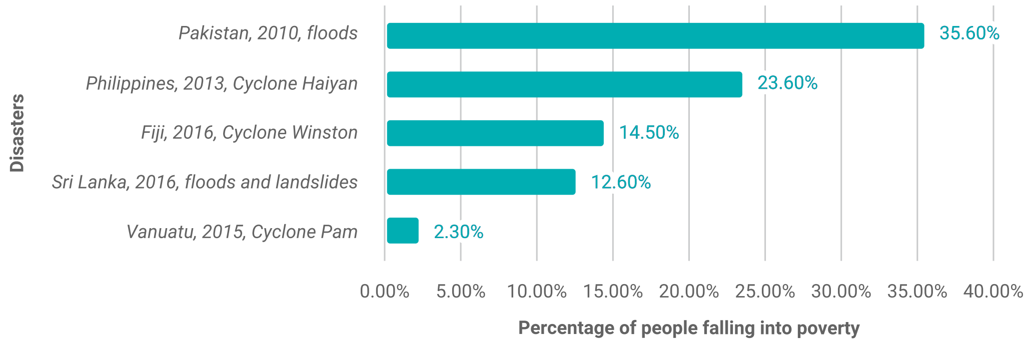
Narrow the gaps, bridge the divides. Rebuild trust by bringing people together around common goals.[47]

Disasters discriminate along the same lines that societies discriminate against people. This GAR has highlighted that headline figures on economic losses and deaths hide fragilities and setbacks in many countries. Despite significant progress over the last two decades, more than 700 million people remain below the extreme poverty line, thus highlighting the relationship among vulnerability, poverty and exposure. After a prolonged decline, the number of undernourished people rose from 777 million in 2015 to 815 million in 2016, mainly due to droughts, conflicts and disasters linked to climate change.[48] The United Nations forecasts that further declines or weak per capita income growth are anticipated in 2019 in Central, Southern and West Africa and Latin America and the Caribbean. These are home to nearly a quarter of the global population living in poverty and often those facing the highest risks of adverse consequences from climate change and extreme weather events.[49]

People living in poverty suffer disproportionally in the wake of a disaster. They are less able to cope as they rarely benefit from social protection schemes, have fewer or no savings to smooth the impacts, their livelihoods depend on fewer assets, and they are more likely to live in low-value, hazard-prone areas in urban centres or depend on vulnerable ecosystems in rural areas. They are locked in protracted cycles of poverty, translated into irreversible effects on education and health, which can strengthen the likelihood of intergenerational transmission of poverty. For example, in Peru, the effects of the 1970 Ancash earthquake on educational attainment can be traced back to the children of mothers affected at birth, highlighting that the effects of large disasters can extend to future generations.[50]

Even though causality should be analysed in finer detail, there is a close two-way relationship between disasters and poverty. Disasters aggravate the depth and breadth of poverty, while poverty exacerbates the way people experience, cope and recover from disasters. ESCAP estimates a significant segment of the Asia–Pacific population fall into poverty from selected disasters (Figure 8.23). This is a reality for several countries across the globe. Previous studies point to similar findings in Latin America where, among the Guatemalan households hit by Tropical Storm Agatha in 2010, per capita consumption fell by 5.5%, increasing poverty by 14%.[51] In Senegal, it is estimated that impacts of disasters between 2006 and 2011 affected households, with 25% more likely to fall into poverty.[52] Similarly, according to World Bank analysis, estimates for 89 countries found that if all disasters were to be prevented next year, the number of people in extreme poverty – those living on less than $1.90 a day – would fall by 26 million.[53]

Figure 8.23. Estimated percentage of people falling into poverty from selected disasters in the Asia–Pacific region



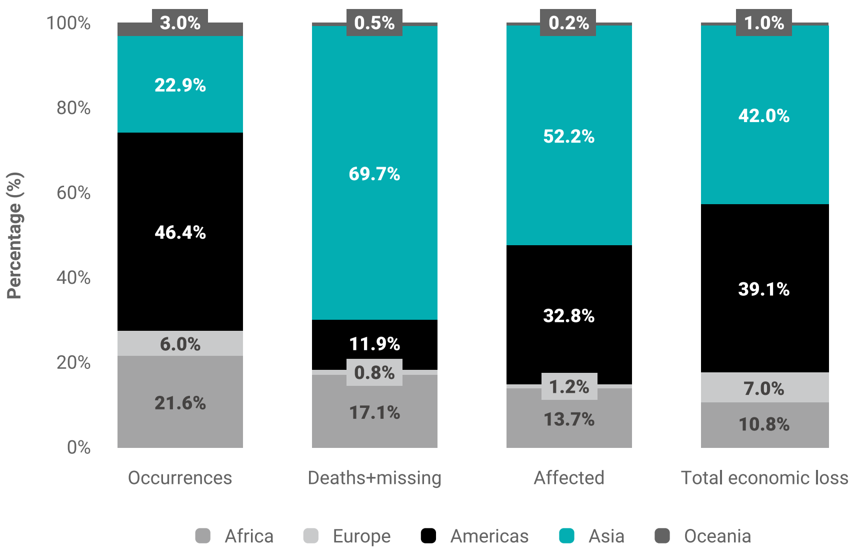
(Sources: ESCAP statistical database and country post-disaster damage assessments, Asia-Pacific Disaster Report 2017)

46 (ESCAP 2017a)
47 (United Nations Secretary General 2018)
48 (United Nations 2019a)
49 (United Nations 2019b)
50 (Caruso and Miller 2015)
51 (Baez et al. 2017)
52 (Dang, Lanjouw and Swinkels 2017)
53 (Hallegatte et al. 2017)

Four years after the adoption of the 2030 Agenda, countries have taken bold steps in terms of reporting, particularly when it comes to indicators used for measuring poverty and inequality (SDGs 1 and 10). Disaster loss data could be analysed against poverty and inequality data to understand, in finer detail, how disasters affect people's lives and direct interventions to reduce poverty and disaster risk in a complementary way, without adding additional reporting burden for countries. This means seeking out high-quality data that can be applied to compare outcomes and changes in poverty, inequality and impact of disasters over time, among and within countries, and investing in doing so year after year. It also means making this data available, raising awareness and building trust in its use while strengthening people's ability to use it, so that their needs are at the core of such processes.[54]

Figure 8.24 reports the distribution of absolute data, namely the total number of disaster occurrences, the total number of deaths and missing persons, the total number of affected people and total economic losses from 2005 to 2017, among the different geographic regions. In terms of geographic distribution, it again becomes apparent that, despite accounting for 23% of disaster occurrences, Asia incurred 42% of the total economic losses recorded at the global level between 2005 and 2017, carrying a disproportionate burden in terms of disaster occurrences and impacts. The Americas, where 46% of disasters occurred, ranks second as far as total economic loss is concerned, but accounts for 12% of the total number of deaths and missing people. Differences in terms of socioeconomic development, preparedness plans and resilience among and within regions can explain this disparity.

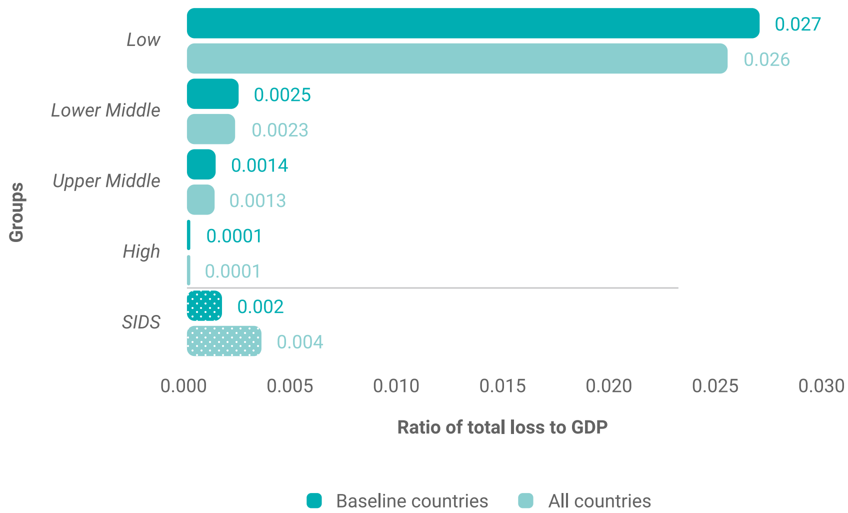
Figure 8.24. Distribution of disaster occurrences and impacts, by region, 2005–2017



(Source: UNDRR with data from DesInventar and World Bank)

Figure 8.25 reports yearly average losses relative to GDP for different income groups over the period 2005–2017. Again, the ratio is significantly higher for low-income countries compared to other income groups, highlighting the gross inequality of burden sharing among income groups, with the lowest-income countries shouldering the greatest impact of disasters. When compared to economic losses, the picture is somewhat different: upper–middle-income and high-income countries account for 46% of economic losses and low-income countries account for the bulk of total mortality in the period 2005–2017 (Figure 8.26). The higher monetary value and more complete data on assets in upper–middle- and high-income countries, where 41% of disasters reported in the database between 2005 and 2017 occurred, can explain the larger extent of economic losses.

Figure 8.25. **Yearly average total loss relative to GDP, by income group and SIDS, 2005–2017**



(Source: UNDRR with data from DesInventar and World Bank)

Figure 8.26. **Distribution of disaster occurrences and impacts, by income group, 2005–2017**

(Source: UNDRR with data from DesInventar and World Bank)

54 (IEAG 2014)

Economic loss trends in global data sets

These are the disparities that headline figures mask where higher registration of disasters and more complete figures on insured losses account for the higher registration of costs. Such figures are misleading as they fail to demonstrate and provide finer details on how disasters affect people's lives. In absolute terms, high-income households lose more because they have more to lose, and those losses are more visible as they tend to be insured and better reported. The 32% of total economic losses that low-income countries in Figure 8.26 experience will be far more challenging to overcome than similar percentages in upper–middle-income or high-income countries. An important issue in disaster loss analysis is the proportion of income or assets lost, as the severity of losses depends on which households experience disasters and how. Proxy indicators and combination of data sources on poverty, inequality, health and sanitation, and education outcomes are useful for adding finer detail and a more comprehensive picture in the analysis, accounting for the real costs of disasters and directing funding to the appropriate initiatives to address the systemic nature of risks.

8.2.5

Target D – damage to critical infrastructure and public services: an encouraging decline in recent years

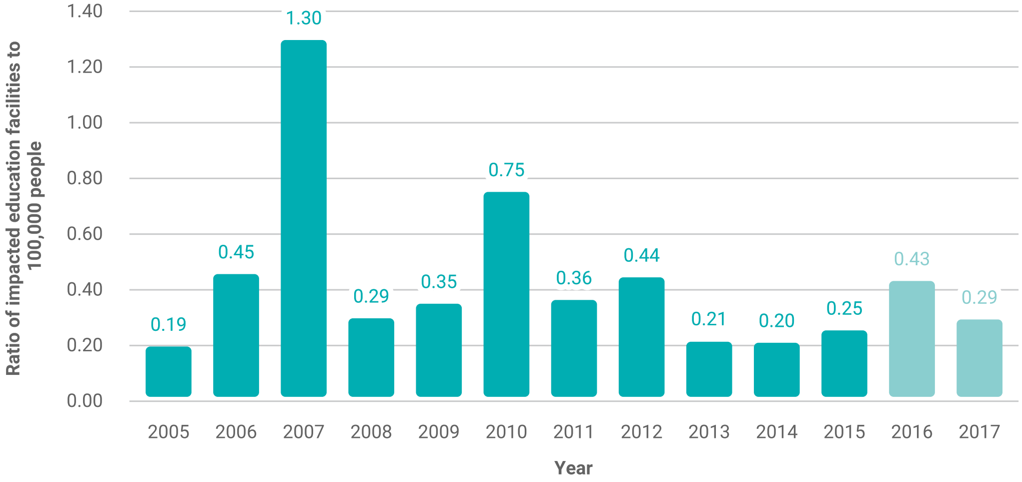
The Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) in 2018 discussed the critical importance of the problem of infrastructure,[55] highlighting that "half of the infrastructure needed in Asia by 2050 has yet to be built". In addition, the whole urban infrastructure should be treated as an interconnected and unique entity in terms of resilience, including the housing, industrial and commercial infrastructure that provides basic services to a growing population in urban areas. A holistic and multisectoral approach is needed when planning critical infrastructure. It should look beyond physical infrastructure and take into account the interdependent nature of services that urban infrastructure provides to society, including energy, water supply, transportation, telecommunications and other critical services.

While the private sector needs to be involved and regulated via policy instruments (including building codes and land-use planning), the responsibility of governments in creating new resilient, risk-informed critical infrastructure is undeniable. Indicators of loss in critical infrastructure in the Sendai Framework will continue to monitor the outcomes of impacts that are usually the direct responsibility of, and executed directly by, governments. This promotes evolution of existing critical infrastructure towards sensible, risk-informed public investments that should result in resilient critical infrastructures serving resilient societies.

Examining long-term trends for infrastructure damage is challenging due to data limitations. Upward trends are particularly susceptible to outliers. For example, 2015 is an outlier in relation to damage to the education and health sectors. This is due to the large impact of the earthquake in Nepal during that year, which caused enormous damage to the built environment, health and education infrastructure. However, data attrition about the amount of damage reported in national databases is becoming a less-significant problem as more damage is reported compared to previous periods.

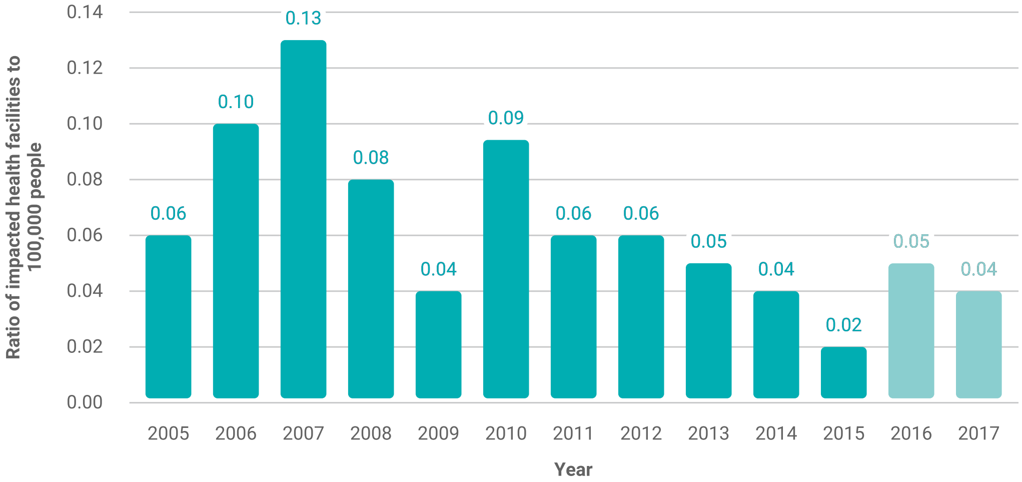
If shorter-term trends are examined (e.g. 2005–2017), the view is different and appears more optimistic. Figures 8.27 and 8.28 show the ratio of affected education facilities and the number of affected health facilities to 100,000 people, respectively, for baseline countries. These figures examine extensive risk only, which limits outlier-related issues. The numbers reported for 2016 and 2017 in Figures 8.26–8.28 are highlighted in different colours as the countries for which data is available is usually different from the baseline period and their number is smaller. Figure 8.29 shows the ratio of damaged roads to the total length of the road network. Health and education damage relative to population size have a downward trend, as shown in the figures. The same is true as far as relative damage to road is concerned, at least before 2016.

Figure 8.27. Damage to education facilities relative to population size, HFA and Sendai Framework period, extensive risk in 83 baseline countries, 2005–2017



(Source: UNDRR with data from DesInventar and World Bank)

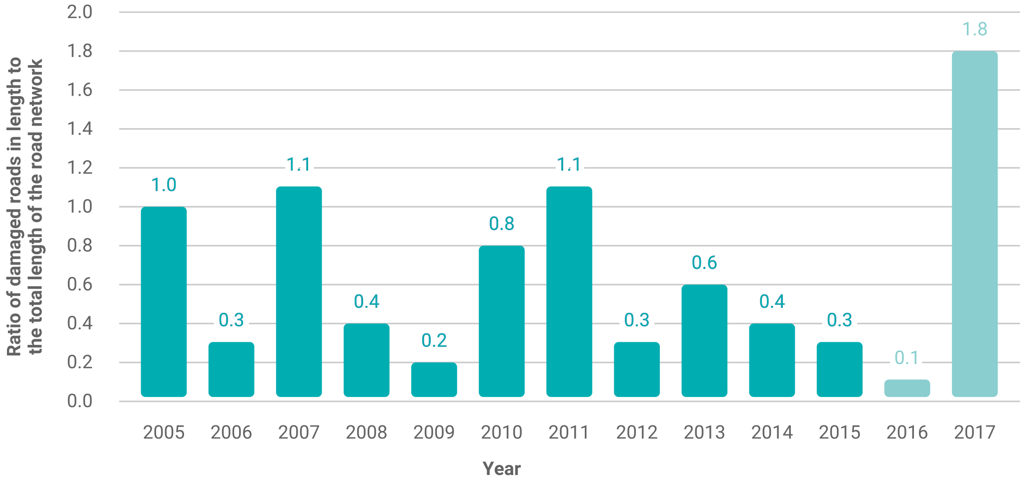
Figure 8.28. Damage to health facilities, HFA and Sendai Framework period, extensive risk in 83 baseline countries, 2005–2017



(Source: UNDRR with data from DesInventar and World Bank)

55 (Fuller 2018)

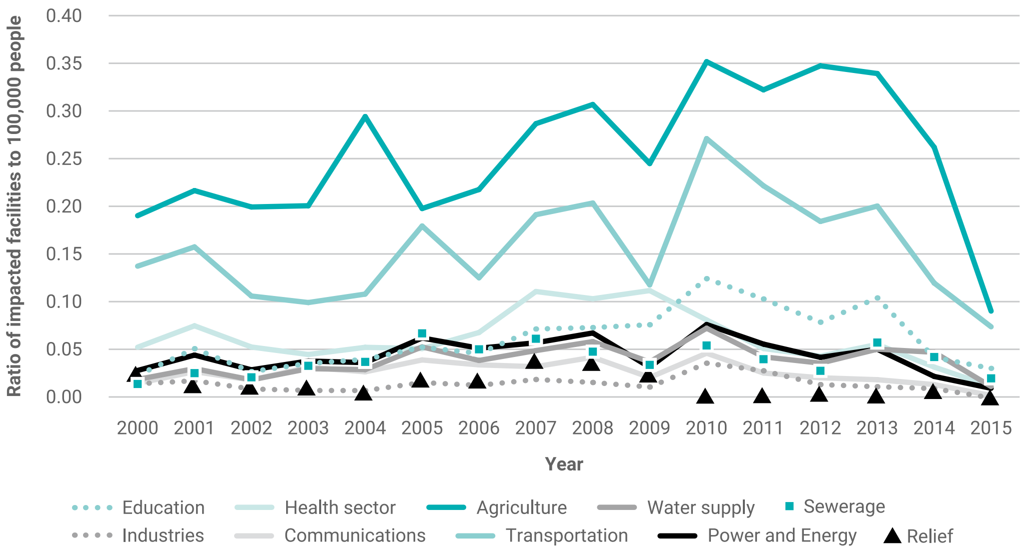
Figure 8.29. Damage to roads relative to total length of road network, HFA and Sendai Framework period, extensive risk in 83 baseline countries, 2005–2017



(Source: UNDRR with data from DesInventar and CIA World Factbook on global road infrastructure)
Note: Countries included in the reporting for 2016 and 2017 in the Sendai Framework period may differ.

Disruptions to basic services, the second part of the target, also exhibit downward trends in recent years. Figure 8.30shows the number of facilities affected by disaster in several sectors, relative to population size. Shorter-term trends (since the start of HFA) show a tendency to decrease in the case of all services.

Figure 8.30. Disruptions to public services relative to population size, 2000–2015



(Source: UNDRR data)

These trends are occurring despite the existence of a big outlier at the end of the series, in 2015, which influences all trends upwards. This is something that must be taken into consideration when analysing trends, as a large-scale disaster can happen at any time and the reading of the data may completely change.

Some of these downward trends in the last 15 years can be explained by DRR efforts of many countries. Campaigns such as Safe Hospitals and Safe Schools have had an important effect on reducing overall damage. Development generally reduces risk. For example, in countries where the percentage of paved roads is growing every year, roads are becoming more resilient.

8.2.6

Targets A–D: extensive risk analysis for the period 2005–2017: surprising facts of extensive risk in recent years

Box 8.1. Basics of extensive risk

Previous GARs (in 2013 and 2015) have defined extensive risk as the set of frequent disasters associated with relatively low intensity hazards. In general terms, extensive risk is the idea of widely spread and relatively frequent small- and medium-scale disasters.

Extensive risk manifests as large numbers of recurrent, low-to-medium-severity disasters, which are mainly associated with localized hazards such as flash floods, landslides, urban flooding, storms, fires and other time-specific events.

When HFA was adopted, the mortality, physical damage and economic loss from extensive risk had not been accounted for in national or international reports, except in a few Latin American countries. As a result, this risk layer remained largely invisible to the international community. However, the sustained efforts from the United Nations system and partners to assist countries in systematically recording local disaster losses has generated systematic and comparable evidence regarding the scale of extensive risk, with data now covering more than 100 countries.

Given most of these data sets have been built using the same indicators, a comparable approach and similar methodology, it is possible to analyse these local records at a global level of observation. Unlike intensive risk, extensive risk is more closely associated with inequality and poverty than with physical features such as earthquake fault lines and cyclone tracks.

Extensive disaster risk is thus magnified by risk drivers such as badly planned and managed urban development, environmental degradation, poverty and inequality, vulnerable rural livelihoods and weak governance. This layer of risk is not captured by global risk modelling, and its losses are not reported internationally in global data sources.

One key feature of previous GARs has been to highlight the contingent liabilities associated with this risk layer, which tend to be absorbed by low-income households and communities, small businesses, and local and national governments, and which are a critical factor in poverty.

This section presents an update to the extensive risk analysis featured in previous GARs. Extensive risk is important for many reasons. However, the main one is that extensive risks are responsible for most damage to infrastructure and livelihoods, perhaps for most economic loss (as shown below) and represents an erosion of development assets such as houses, schools, health facilities, roads and local infrastructure. GAR efforts to reveal extensive risk aim at making the cost visible, as extensive risk losses tend to be underestimated and are usually absorbed by low-income households and communities.

For this GAR19, a focused analysis of extensive/intensive risk has been conducted. It is now limited to the period of the monitoring of the two frameworks – HFA (or the baseline) and the Sendai Framework – meaning the latest 12 years of data. In previous GARs, a longer period was researched, which may have introduced biases due to less data reporting in the initial years covered by the databases. While the period of the research is now shorter, the number of records analysed is high, with 320,000 disaster records, and includes a higher number of countries (104), which add to its strength as a statistical sample.

There is now a broader scope of hazards included in this sample, because of the call in the Sendai Framework to also address biological and environmental hazards (grouped under "biological") and human-induced (technological) hazards. This sample therefore includes all reported epidemics, industrial accidents and deforestation.

Table 8.1. **Extensive risk figures disaggregated by hazard family, 2005–2017, summarizing the main figures obtained in the analysis**

Risk type	*Hazard type*	*Number of disasters recorded*	*Number of deaths*	*Number of houses destroyed*	*Number of houses damaged*	*Number of education centres affected*	*Number of hospitals affected*	*Area of damage to crops (ha)*	*Indicator C-1a – total economic loss ($)*
Extensive	Hydrometeorological	210,838	42,563	513,493	5,123,026	26,617	3,241	90,331,709	108,471,332,292
	Geological	7,687	1,248	47,468	293,685	3,157	267	473,679	4,088,850,199
	Biological	73,783	23,164	289	50,926	48	147	9,467,320	9,164,221,167
	Man-made	23,406	15,895	3,709	127,621	1,232	68	496,989	1,346,163,360
	Subtotal	315,714	82,870	564,959	5,595,258	31,054	3,723	100,769,697	123,070,567,018
	Percentage	99.60%	29.59%	22.52%	82.01%	69.32%	68.21%	94.45%	68.22%
Intensive	Hydrometeorological	890	127,996	1,423,289	908,427	10,132	1,364	5,685,515	42,481,666,285
	Geological	155	44,748	520,046	316,253	3,597	364	57,000	14,776,671,307
	Biological	185	17,241		67	2	3		670,581
	Man-made	47	7,249	180	2,291	15	4	174,176	68,693,954
	Subtotal	1,277	197,234	1,943,515	1,227,038	13,746	1,735	5,916,691	57,327,702,127
	Percentage	0.40%	70.41%	77.48%	17.99%	30.68%	31.79%	5.55%	31.78%
TOTAL		316,991	280,104	2,508,474	6,822,296	44,800	5,458	106,686,388	180,398,269,145

(Source: UNDRR data)

It is important to note that year aggregates of economic loss cannot be classified as extensive or intensive because they are not records of individual disasters. In general, the annual consolidate surpasses the threshold of extensive risk, so most consolidated data would come under the category of intensive.

The weight of extensive risk in the economic losses area, using this sample of data, is much higher than that found in previous research periods: 68% of all economic losses in this period are caused by small and medium, localized and frequent disasters. This contrasts with previous findings of 42% of economic loss, and is perhaps a confirmation that after many achievements made by Member States in reducing intensive risk, their attention should now shift to addressing extensive risk.

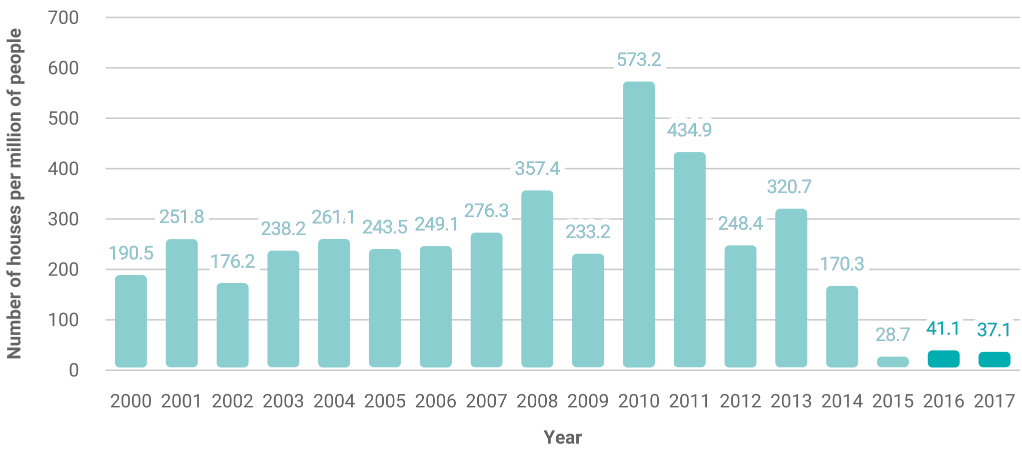
Monitoring extensive and intensive risk

Extensive risk shows different trends from those that are apparent in the full sample of data. This is a consequence of the absence of outliers produced by large-scale disasters. In the case of the HFA and Sendai Framework eras, there were some outliers, especially in 2015 with the earthquake in Nepal, and with a generally damaging year in 2011. Had the sample included the United States of America, there would be bigger outliers in 2011 and 2017. The trend without the outliers is important because it shows how risk is affecting a huge proportion of the world – most importantly, the poor.

Figure 8.31 shows relative losses in the housing sector, which dominate the overall losses, along with agriculture, in all SFM countries from 2000 to 2017. Relative losses are calculated by dividing the number of damaged or destroyed houses by population. Against steady increases in the first 10 years, losses have significantly declined since 2010. However, data for years 2015, 2016 and 2017 should be taken with caution as the number of disasters for which data on the number of damaged or destroyed available in the database is significantly smaller than in previous years.

One of the conclusions is that economic loss, in absolute terms, continues to grow in disasters at all scales. However, despite the high number of extensive risk disaster records (99.6% of all data) and a higher contribution to overall economic loss, the impact of extensive risk is slowly receding within the data available at this time. This reduction of economic impact is visible at a global scale and is

Figure 8.31. Number of houses damaged/destroyed relative to population size, extensive risk in all SFM countries, 2000–2017



(Source: UNDRR with data from DesInventar and World Bank) reflected in similar trends in the relative losses of the set of countries reporting to the Sendai Framework Monitoring system.

8.3

Target E: Progress on disaster risk reduction strategies for 2020

Two years before the deadline of Target E, there is no comprehensive picture of all strategies in place. The target speaks plainly about “national and local disaster risk reduction strategies”, but the indicators that will measure this target are more difficult to quantify. Indicator E-1 requires national strategies to be “in line with the Sendai Framework”, and local strategies to be “in line with National Strategies”. It could be inferred therefore that local strategies should also be aligned with the Sendai Framework.

Some strategies are limited in scope and action, taking into consideration the specific context and capacity of the country. Therefore, DRR strategies are considered as a set of policy documents on relevant policy areas, from sectoral perspectives, or of targeted specific hazards. Measurement of compliance with the Sendai Framework should consequently be loosely interpreted.

The technical guidance notes proposed that the alignment of strategies with the Sendai Framework could be measured by a simple system of assigning scores, which, despite their subjectivity, could identify the alignment of a national strategy to the Sendai Framework. Box 8.2 shows the 10 criteria used for monitoring the progress of national DRR strategies where Member States conduct their own self-assessments. It should be underlined that attributed scores are for the alignment of national strategies to the Sendai Framework only, and do not offer any assessment on implementation of the strategy.

As with other targets and indicators, there are several data sources, which gives nuance to the conclusions to be drawn. In order of priority, these data sources are: the monitoring system, the UNDRR survey on implementation of the Sendai Framework, the Data Readiness Review and the results of the last rounds of reporting of HFA.[56]

This section presents the results of the officially reported data available in the online Sendai Framework Monitoring system. By expanding on facts and figures from other data sources, it provides the best available overview of how Member States are progressing on DRR strategies.

Box 8.2. Key elements in DRR strategies used to assign a score to Indicator E-1, Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework

i. Have different timescales, with targets, indicators and time frames

ii. Have aims at preventing the creation of risk

iii. Have aims at reducing existing risk

iv. Have aims at strengthening economic, social, health and environmental resilience

v. Address the recommendations of Priority 1, Understanding disaster risk

vi. Address the recommendations of Priority 2, Strengthening disaster risk governance to manage disaster risk

vii. Address the recommendations of Priority 3, Investing in disaster risk reduction for resilience

viii. Address the recommendations of Priority 4, Enhancing disaster preparedness for effective response and to build back better in recovery, rehabilitation and reconstruction

ix. Promote policy coherence relevant to DRR such as sustainable development, poverty eradication and climate change, notably with SDGs and the Paris Agreement

x. Have mechanisms to follow up, periodically assess and publicly report on progress

Each element is weighted equally with the following criteria:

i. Comprehensive implementation (full score): 1.0

ii. Substantial implementation, additional progress required: 0.75

iii. Moderate implementation, neither comprehensive nor substantial: 0.50

iv. Limited implementation: 0.25

v. If there is no implementation or no existence: 0

(Source: UNDRR 2018b)

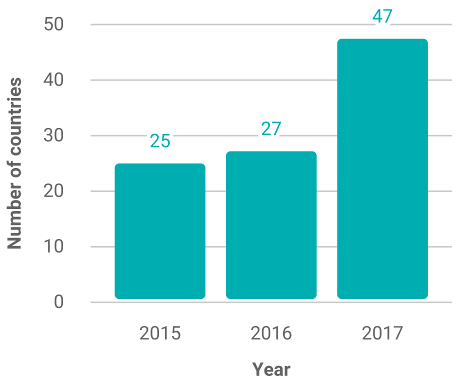
8.3.1

Data from the online Sendai Framework Monitoring system

The first important figure is the number of countries that reported on their progress on their strategies. In 2017, 47 Member States reported the status of their national and local DRR strategies. In 2016, only 27 countries reported, and 25 did so for 2015. The fact that more data was reported for 2017 than previous years reflects that the online monitoring system was launched in March 2018 and the technical guidance notes were developed over the course of 2016. Among the 47 reporting countries, only 6 reported that they have national DRR strategies in comprehensive alignment (100% compliance) with the Sendai Framework, according to the 10 criteria of the national DRR strategies in line with the Sendai Framework. Seventeen countries reported that their national DRR strategies have substantial alignment with the Sendai Framework (E-1 score of 0.67–0.99), while 10 countries have limited or no alignment (score of 0–0.33).

As of October 2018, the overall average compliance of alignment with the Sendai Framework is 0.60.

Figure 8.32. Indicator E-1, number of countries reporting on national DRR strategies, 2015–2017



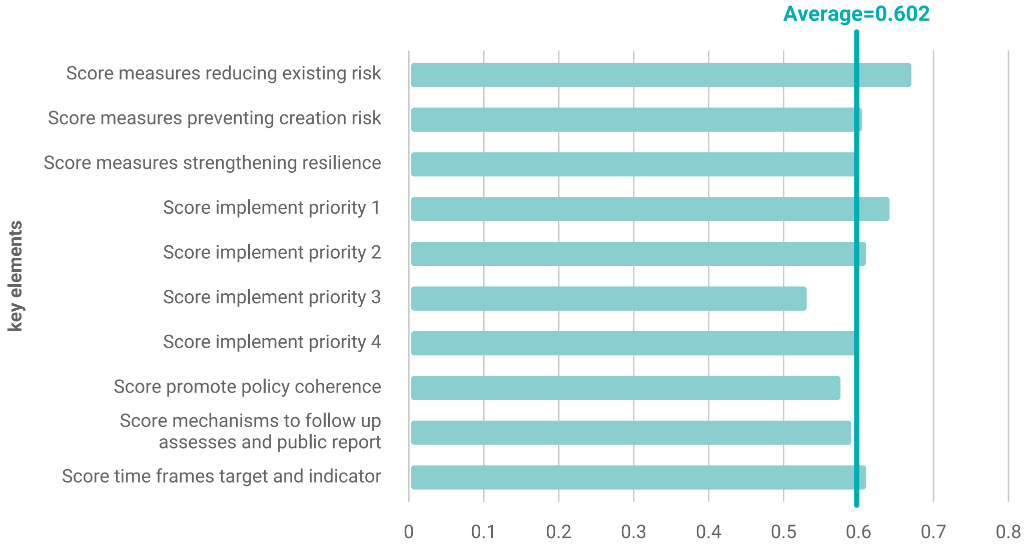
(Source: UNDRR data)

On closer examination, more Member States report that their national DRR strategies have better ratings in elements of measuring reducing existing risk (0.67 average) and in Priority 1, Understanding risk (0.64 average), than implementing Sendai Framework Priority 3, which seems to be more challenging (0.53 average). In the Readiness Review, conducted in early 2017, having indicators in the

56 (United Nations 2017a)

national DRR strategies seemed the biggest challenge for countries. One third of reporting countries answered they did not have indicators, while by October 2018, about one quarter of reporting countries did not have "different timescales, with targets, indicators and time frames" (0.60 average).

Figure 8.33. Average scores of the 10 key elements for national DRR strategies to be in line with the Sendai Framework



(Source: UNDRR data)

Several countries have reflected recent progress to improve their national DRR strategies in line with the Sendai Framework in currently reported values. For example, Namibia already had national DRR strategies in 2015, with a low alignment to the new Sendai Framework at that time. The strategy has been improved over three years (score of 50% in 2016). With the National Strategy for Mainstreaming Disaster Risk Reduction and Climate Change Adaptation into Development Planning in Namibia 2017–2021, the set of DRR strategies and policies is in comprehensive alignment with the Sendai Framework (self-score of 100% in 2017).

Czechia did not have a DRR strategy in 2015. National DRR strategies have been implemented since 2016 (score of 90% in 2016). In 2017, the country added full compliance to subindicator (x) – embedded mechanisms to follow up – increasing its score to 92.5%.

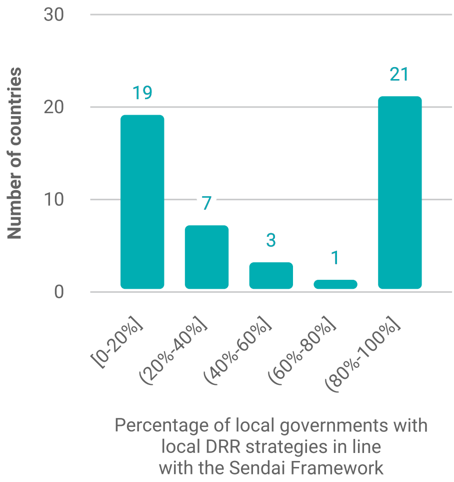
8.3.2

Indicator E-2

Another important figure to highlight is the number of countries that reported on their local DRR strategies. In 2017, 42 Member States reported the proportion of local DRR strategies available in local governments, while only 21 Member States reported so in 2016 and 18 in 2015. Note that local government is defined as a form of subnational public administration with responsibility for DRR – to be determined by countries. Among 35 countries that reported the status of their local DRR strategies, 17 reported that all of their local government bodies have local DRR strategies in line with their national DRR strategies, while 7 countries reported no local DRR strategies or without alignment to their national strategies.

Several countries have reflected recent progress in increasing the proportion of local governments having their local DRR strategies. For example, in Montenegro, in 2015, there was no DRR strategies; however, the number of local governments with local DRR strategies in line with the national DRR increased from 2 (9.1%) in 2016 to 6 (27.3%) in 2017, out of all 22 local governments. In Eswatini, the number of local governments with local DRR strategies in line with the national DRR is gradually increasing over time: 115 (32.6%) in 2015, 119 (33.7%) in 2016 and 121 (38.3%) in 2017, out of all 353 local governments.

Figure 8.34. Indicator E-2, number of countries with local DRR strategies in line with their national DRR strategies, 2017



(Source: UNDRR data)

Box 8.3. Complementing SFM with other data sources

As in the previous section on analysis of monitoring data, 47 countries have reported on Target E (Indicator E-1) on national DRR strategies. Taking into account that this number should not be treated as representative, the information was complemented with other sources. The following sources of information were analysed in order of hierarchy: data from SFM, a survey questionnaire and UNDRR support to Member States, complemented by countries who reported in the Readiness Review but not covered in the earliest lists.

At the time of the Readiness Review that UNDRR conducted at the beginning of 2017, out of the 87 countries who responded, 50 said that they either had a national strategy or were working on a strategy at different levels of progress. A survey was also conducted among Member States in the fourth quarter of 2018 to get a snapshot of country reported progress in implementing the Sendai Framework, including progress on Target E. Information of 42 countries was collected in this process. UNDRR has also been engaging with some Member States to support them in their progress on Target E.

Based on the above, a triangulation of information from all these sources was conducted. This provided information for 121 unique countries as available in one or more of these sources. Out of these 121 countries, 82 reported that they have made substantive or full progress in the development of national strategies aligned to the Sendai Framework. The remaining 39 countries have thus far made medium or low progress. Regrettably, these sources of information do not allow for extrapolation, meaning that with the data available, it is not possible to estimate the progress of the remaining 70 Member States.

SFM remains the main and official source of information for tracking progress on the implementation of the Sendai Framework. Hence, all Member States are encouraged to continue reporting through the monitor. All other sources are complementary and will not be used when a sufficient level of reporting is achieved in the official system.

8.4

Target F: Measuring international cooperation – too early for conclusions

In the Data Readiness Review study, Member States were asked to assess the availability and feasibility of providing data on the key indicators. This revealed that only 38% of Member States (33 out of 86 participating countries) would be capable of reporting on Indicator F-1: "Total official international support (official development assistance (ODA) plus other official flows), for national disaster risk reduction actions"; similar or lower numbers were reported for other indicators. For example, only 23% stated they would be able to report Indicator F-4: "Total official international support (ODA plus other official flows) for the transfer and exchange of disaster risk reduction-related technology". Participation in the first cycle of the monitoring exercise confirms this sparse availability of data. The average reporting rate for Indicator F-1, by far the best for Target F, reached only 25% of Member States. No analysis is provided for the rest of the indicators of Target F due to the low participation in monitoring.

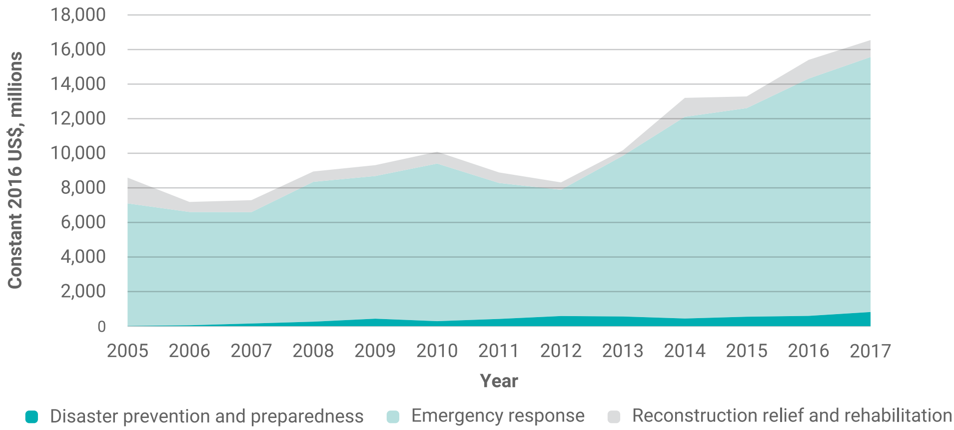
The data available for tracking ODA and DRR expenditure and to fully account for these costs remains incomplete at a global scale. For instance, OECD reports that where such information exists, it is not gathered on a regular basis due to accounting and administrative fragmentation across sectors and levels of government collecting and processing such data.[57] Macrolevel data on the global disaster risk financing gaps, and national and subnational data are necessary. To achieve this, improvements in reporting are required immediately. The renewed attention through the Sendai Framework provides an excellent opportunity for countries to report on national data and better understand the interplay between national and international sources in disaster risk financing. Providing a more comprehensive picture on where disaster aid and spending flows will help to build the evidence base for improved prevention, mitigation and preparedness funding. It is possible to start forming a global picture of financing for DRR using proxy indicators. In coming iterations of reporting for SFM, the availability of nationally reported figures will grow, and the use of proxies will complement increasingly granular data.

Analysing data from other sources such as OECD DAC[58] shows that, for instance, development assistance for DRR has remained a persistently small fraction of the total international aid financing landscape, and that disaster expenditure is predominantly ex post.[59] Data on development assistance for disasters can be captured – but is not limited to – three types of ODA: disaster prevention and preparedness, reconstruction relief and rehabilitation, and emergency response (Figure 8.35). The figure of $5.2 billion for DRR represents 3.8% of the spending in the period 2005–2017, which is a marginal fraction of the total amount. Most of the finance, $122 billion (89%), flows to emergency response, while $9.84 billion goes to reconstruction relief and rehabilitation (Figure 8.35).

Resource gaps continue to be significant and disproportionally borne by countries most in need. In addition, most efforts are concentrated in supporting preparedness and recovery, at the expense of funding dedicated to understanding the underlying vulnerabilities contributing to disasters. As captured in previous GARs, the increasing gap between demand for response to disasters and available global funding stresses the need for effective integrated measures that support DRR in the framework of sustainable development.

Although there is an increasing convergence between international development and humanitarian funding, financing gaps for disasters also support the above findings. Figure 8.36 demonstrates the difference between funding requested and the funding provided by the global humanitarian community; pointing to an eightfold increase in terms of financing gaps. In other words, and aligned

Figure 8.35. **Share of DRR in international aid for disasters (constant 2016 $, millions), 2005–2017**



(Source: UNDRR with data from OECD)

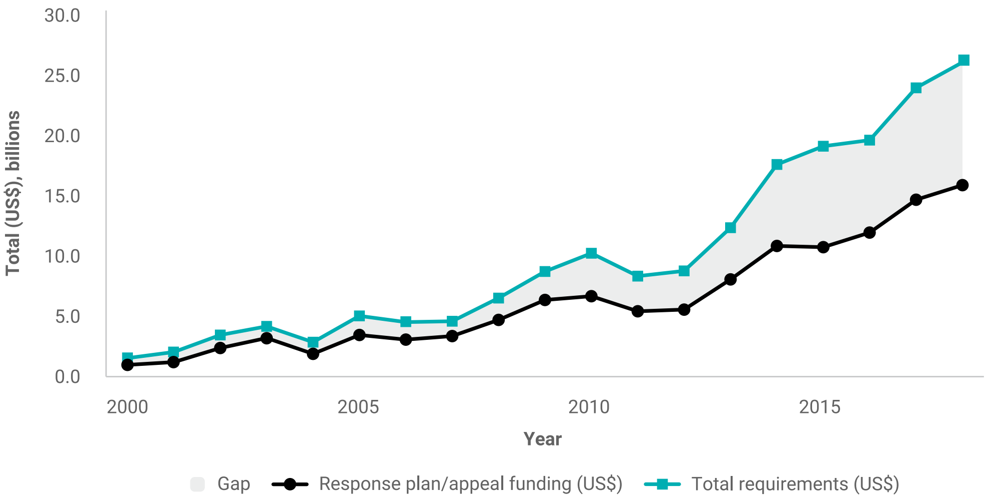
with previous GAR findings, global funding requirements are increasing, while the national and international capacity to address them is not growing in proportionate terms. This finding should be treated with considerable caution given pressures on traditional funding sources and sustained concern for the millions of people affected by disasters each year, who do not receive the assistance and protection required to rebuild their lives.[60] A previous study on 20-year trends of ODA[61] demonstrates that where the economy is at risk, volumes of financing tend to be more timely and substantially higher; where predominantly populations are at risk, volumes are often lower.

Deliberations in AAAA reiterated the need for renewed attention to financial instruments and innovations designed to reduce vulnerability to risk. For instance, scaling up the use of State contingent debt instruments – debt contracts that link debt service payment to a country's obligation to service it – linked to disasters could be an alternative measure. Such approaches need to be integrated in a broader package of efforts that seek to ensure countries have access to a risk-informed approach to finance on terms and conditions commensurate with their circumstances.

A positive international development in funding for disaster risk is the burgeoning field of disaster risk financing – a term that covers a wide range of global, regional and national risk-sharing and risk-transfer systems and products (public and private). The quantification of disaster risk for insurance and risk-sharing purposes is another form of incentive to reduce risk, although its focus is to produce better outcomes in socioeconomic development. Again, the financial flows related to these are unlikely to be counted in ODA figures. The complexity of this field requires a much more detailed treatment than can be done in this GAR, but these developments are important to note for future consideration in reporting on F-1 (total international flows), F-2 (multilateral organization flows) and F-3

57 (OECD 2018a)
58 (OECD 2018b)
59 (Watson et al. 2015)
60 (OCHA 2019)
61 (Kellett and Caravani 2013)

Figure 8.36. Funding received and funding requested through United Nations appeals, constant 2017 $, billions, 2000–2018



(Source: UNDRR with data from OCHA Financial Tracking Service)

(bilateral flows). For example, concerning multilateral organizations, GFDRR,[62] the World Bank[63] and its Global Risk Financing Facility,[64] and regional development banks such as the Asian Development Bank (ADB)[65] provide national project funding, grants and loans specifically targeted at disaster risk financing. They also focus on capacity development to reduce risk, to track expenditure on DRR and to promote integration with CCA and climate change mitigation.

8.5

Target G: Multi-hazard early warning systems, – progress and challenges observed

Target G addresses the availability of, and access to, MHEWSs and disaster risk information and assessments. Indicators G-2 to G-4 are based on the four key elements of EWSs, informed by an international network on MHEWSs,[66] namely: (a) disaster risk knowledge based on the systematic collection of data and disaster risk assessments (G-5); (b) detection, monitoring, analysis and forecasting of the hazards and possible consequences (G-2); (c) dissemination and communication, by an official source, of authoritative, timely, accurate and actionable warnings and associated information on likelihood and impact (G-3); and (d) preparedness at all levels to respond to the warnings received (G-4). Indicator G-1 is a compound indicator of the four indicators and stands for a fully fledged MHEWS with four key elements taking the values 0–1.

Reporting against Target G has been a challenge for Member States, although indicators were developed to take into account the global feasibility of reporting. Thirty-four Member States have reported at least one indicator for 2015–2018 (mostly related to Indicator G-3), while the smallest number reported on G-2 and G-5, which require a multi-hazard approach and specification of major hazards.

Among the 34 reporting countries, 14 have reported a complete set of indicators from G-2 to G-5, which enables calculation of G-1. Despite a small number of reporting countries, the results reveal room for improvement on this target in most countries. Above all, reporting against G-5, with the lowest average among G-2 to G-5, demonstrates that most countries need comprehensive risk assessment for their defined major hazards.

Indicator G-2 refers to multi-hazard monitoring and forecasting systems. This indicator requires defining major hazards targeted for monitoring and forecasting systems. As shown in Table 8.2, there are two peaks at the upper and lower ends. In other words, several countries have multi-hazard monitoring and forecasting systems that cover major hazards well, while other countries do not. For example, Lebanon identified a wide variety of major hazards, including biological hazards, to be monitored and forecast. As some institutions are involved in MHEWSs, Lebanon is working on the development of an early warning platform, which will contribute to standardized processes and clear roles and responsibilities. Warning messages of several types of hazards would be further improved to include risk information to trigger response reactions disseminated in a timely and consistent manner.

Indicator G-3 relates to coverage of early warning information or penetration rate of communication modes. Among 31 reporting countries, 10 reported their targeted population is fully covered. In the case of Namibia, penetration ratios of local communication and mass media increased from 2015 to 2017, which has enabled early warning information

Table 8.2. Target G, number of countries by total score for each dimension of Indicators G-2 to G-6

Number of reporting countries and average score by indicator for Target G		
Indicator	*Number of reporting countries*	*Average score*
MHEWS (G-1: report all of G-2 to G-5)	14	0.45
Multi-hazard monitoring and forecasting systems (G-2)	19	0.58
Coverage of early warning information (G-3)	31	0.72
Local governments with plans to act on early warnings (G-4)	23	0.64
Disaster risk information and assessment (G-5)	17	0.38
Protected population through pre-emptive evacuation (G-6)	7	0
Any of indicators for Target G (G-1 to G-6)	34	–

62 (Hallegatte, Maruyama and Jun 2018); (De Bettencourt et al. 2013); (GFDRR 2018b)
63 (Alton, Mahul and Benson 2017)
64 (Global Risk Financing Facility 2019)
65 (Juswanto and Nugroho 2017); (ADB 2019)
66 (UNISDR 2006); (WMO 2017)

to reach the whole population. Reported penetration rates show that mass media can reach more people than local communication systems such as sirens and public bulletin boards.

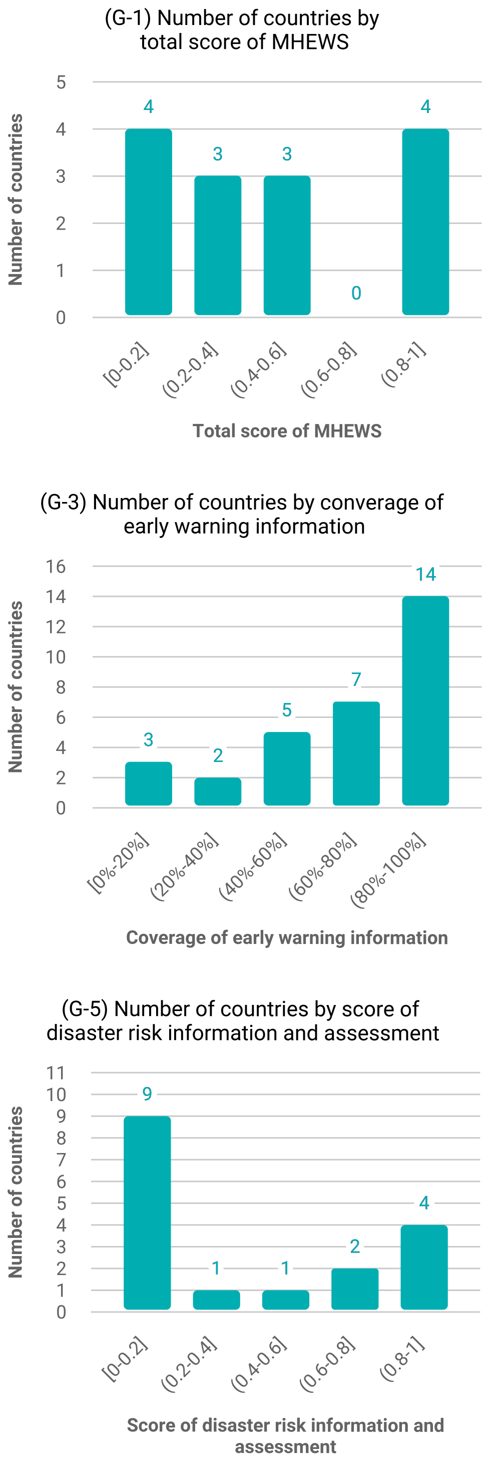
Indicator G-4 relates to local plans to act on early warnings, which are related to preparedness. Among 23 reporting countries, 12 reported that all of their local governments have a plan to act on early warnings, while 4 reported no plan to act on early warnings at the local level. To improve preparedness and respond to the warnings received at the local level, all local governments need such plans to act on early warnings.

Indicator G-5 is related to risk information and assessment. Only 3 out of 17 countries have available disaster risk information and assessment for their defined major hazards. Myanmar reported the existence of risk information and assessment for seven major hazards. The data demonstrates that Myanmar has high-quality risk information and assessment systems against cyclones, earthquakes, floods, heavy rainfalls and tsunamis.

Indicator G-6 relates to population protected through pre-emptive evacuation following early warning. This indicator can measure a positive aspect of evacuated people with a focus on saving lives. However, data collection and reporting against this indicator is a challenge. Among six reporting countries, only the United Republic of Tanzania reported data for this indicator, while another three countries reported nothing and the other two reported partially on the number of people protected through pre-emptive evacuation (or a proxy as evacuated people).

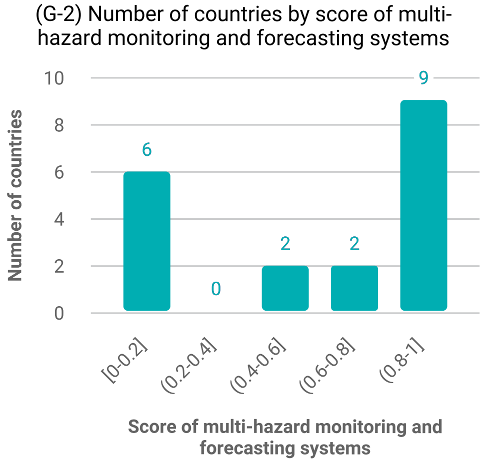
Several countries reported their recent progress on improving their MHEWSs from 2015 to 2017. For example, Czechia has improved monitoring and forecasting systems and risk assessment against drought from 2015 to 2016, which can be observed by increasing scores of G-1, G-2 and G-5. The United Republic of Tanzania has continuously improved its MHEWSs over this period in all areas of the four key elements. It is piloting implementation of MHEWSs, which can provide warning information on natural

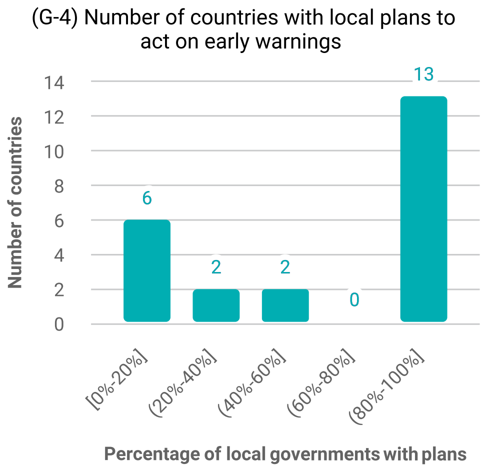
Figure 8.37. Number of countries reporting on Indicators G-1 to G-5



(Source: UNDRR data)

hazards such as extreme temperatures, landslides, floods, strong winds and storm surges/tsunamis. Progress is reflected in increasing scores on the five indicators G-1 to G-5.





8.6

Conclusions on the first reporting data for Sendai Framework Targets A–G

This GAR is informed by the latest disaster data available and infers early lessons on where the global disaster risk landscape currently stands. In terms of data infrastructure, there has been growing awareness since 2015 on the need for better and more comparable data, and SFM represents a unique opportunity to streamline interoperable data on disaster losses. While the observed period is still too short to reach definitive conclusions on a global scale, it is possible to observe certain patterns in terms of magnitude, geographic and socioeconomic distribution of disaster impacts and abstract several departure points of where and how countries have managed to do better in reducing disaster risk:

a. In the broader picture, in terms of losses, there are severe inequalities of burden sharing between low- and high-income countries, with the lowest-income countries taking the highest toll and greatest costs of disasters. Asset and human losses tend to be higher in countries that have the least capacity to prepare, finance and respond, such as SIDS. However, the good news is that there has been an increase in the percentage of reporting containing economic loss data, for all income groups, particularly in the last four years, in contrast to former declining trends.

b. Mortality relative to population size has declined in the long term. However, since 1990, 92% of mortality attributed to internationally reported disasters associated with natural hazards has occurred in low- and middle-income countries, persistently concentrated in the Asia–Pacific region and Africa.

c. Geophysical hazard events (e.g. earthquakes and tsunamis) have taken the highest toll on human lives. Occurrences of reported disasters associated with biological hazards have decreased, while the number of disasters associated with natural hazards has slightly increased, over the past two decades. In terms of affected people, multi-hazard disasters affected 88 million people in SFM countries, followed by floods affecting 76 million people, in the period 1997–2017.

d. Disasters stemming from natural hazards have displaced an average of 23.9 million people each year over the last decade.[67] Disasters – the main triggers of forced displacement recorded – show no signs of decreasing.

e. Intensive risk continues to dominate fatalities, but the participation of extensive risk in mortality seems to be increasing. Most economic losses in the period 2005–2017 were caused by disasters associated with extensive risk, with 68.5% of all economic losses attributed to extensive risk events. With disasters becoming increasingly frequent, the cumulative damage, especially for people living in poverty, is often greater for extensive disasters such as droughts, than small- and medium-sized shocks that deliver low intensity but more frequent and recurrent shocks.

f. In line with the analysis in previous GARs, extensive risks represent an ongoing erosion of development assets, such as houses, schools, health facilities, roads and local infrastructure. However, the cost of extensive risk continues to be underestimated, as it is usually absorbed by low-income households and communities.

g. Weather-related hazards take the lead in economic losses, with floods being the costliest hazard, followed by earthquakes. Meanwhile, losses in the housing sector account for two thirds of total economic losses.

h. Losses in agriculture, the second most-affected sector, are again significantly higher and more persistent in low- and low–middle-income countries, with increasing frequency and severity of floods, droughts and tropical storms. The relationship between drought and agriculture deserves special attention, as 84%[68] of the damage and losses caused by droughts resides therein. Beyond the obvious production losses, disasters have a significant impact on rural livelihoods, food value chains, trade flows of agricultural commodities, and food and non-food agro-industries. Initiatives to support diversification of livelihood opportunities, farm and non-farm activities, and more sustainable (self-) employment are critical. Expanding financial inclusion, providing social protection and adaptive safety nets, contingent finance and forging ownership by supporting rural communities to invest their savings into economic ventures of choice can place households in a better position to cope with disasters and build back better.

i. Financing for DRR has been highly volatile, ex post and marginal. A total of $5.2 billion for DRR represents 3.8% of total humanitarian financing between 2005 and 2017 – less than $4 for every $100 spent – a marginal fraction of the total amount. Global funding requirements are increasing, while the national and international capacity to address them is not growing in proportionate terms, leaving millions of affected populations behind.

j. Member States reporting on the status of their national and local DRR strategies are gradually increasing, yet improvements for a full coverage on a global scale are to be made, one year ahead of the deadline.

k. Economic losses from disasters totalled $75 billion in 2017 (UNDRR data), and over $300 billion from other sources (Munich Re and Swiss Re). The $75 billion estimate of the average annual losses deviates substantially from other observations, as data is imperfect and disasters remain significantly non-/under-reported, compromising accurate calculations of the true impacts of disasters. Eleven years ahead of the 2030 deadline, a sense of urgency should be injected into improving reporting across indicators and targets, enabling the engineering of evidence-based solutions for disaster-affected populations.

l. While useful for illustrating the stocktake of average losses, average estimates often fail to provide finer details on how disasters affect people's lives. In absolute terms, high-income households lose more because they have more to lose, and those losses are more visible because they tend to be insured and better reported. Previous GARs have repeatedly argued that what matters most in disaster loss analysis is the proportion of income or assets lost, as the severity of losses depends on households and how they experience disasters.

m. This GAR argues that as data-collection efforts across different global frameworks are embarked upon, it is necessary to look at indicators afresh across goals and targets. It is also necessary to establish metrics for those dimensions of disaster impacts that accrue to the most vulnerable by delving deeper into distributional analysis, moving away from regional, national and subnational data to the household level. The goal is to first learn in finer detail how disasters affect people's lives in a systemic way and then support countries to engineer solutions and influence human behaviour to successfully rebound from disasters.

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67 (Internal Displacement Monitoring Centre 2019)

68 (FAO 2015b)

Chapter 9: Review of efforts made by Member States to implement the Sendai Framework

The Sendai Framework represents a risk-informed approach to sustainable development and is closely associated with specific demands regarding data collection and analysis. Renewed commitments and demand for robust and evidence-based guidance on DRM require the transformation of behaviour and practice in multiple dimensions. These include data, policy, planning protocols, collaboration mechanisms for effective decision-making, and technical and functional implementation capacities. The data requirements to meet these goals require coordination among relevant stakeholders, which has traditionally not been a reality.

The 2017 Sendai Framework Data Readiness Review, with contributions from 87 countries, assessed countries' readiness to monitor and report, in addition to the availability of national disaster-related data and requisite gaps in terms of financial resources and technical expertise. Within the group of countries participating in the review, a quarter reported no or only preliminary progress on national and local DRR strategies and plans aligning with the Sendai Framework (Target E), 72% reported medium to substantive progress on alignment and 3% reported full implementation. The review concluded that effective reporting of progress towards the global targets of SDGs and the Sendai Framework would require the use of multiple types of data, including EO and geospatial information. Advances in national reporting and data-collection practices offer useful standards, tools and approaches to guide countries efforts in bridging the gap between where they are today and where they need to be to support the goals of the Sendai Framework.

9.1

Disaster loss databases

The Sendai Framework and its predecessor, HFA, have explicitly recognized the importance and usefulness of collecting loss data as one of the actions that will help countries to increase knowledge about the risks they face. In addition to the loss data for Targets A–D outlined in the previous chapter, Sendai Framework Priority 1, Understanding disaster risk (para. 24), suggests that Member States:

> **(d)** *Systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information;*
>
> **(e)** *Make non-sensitive hazard exposure, vulnerability, risk, disaster and loss-disaggregated information freely available and accessible, as appropriate;*

The text of the Sendai Framework (para. 15) states:

> *The present Framework will apply to the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risks. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.*

There are several consequences of the wider scope of the Sendai Framework. The explicit recommendations of Priority 1 on loss data collection, and that the global indicators for Targets A–D require loss data, mean that countries are strongly encouraged to account systematically for disaster losses and damage for a wide spectrum of disaster scales and a broader set of hazards. For over a decade, UNDDR has been working with Member States to promote disaster loss accounting. Systematically accounting for losses translates, in technological terms, into the creation of national disaster loss databases that can record many loss indicators for disasters, at all scales, in a disaggregated manner. Priority 1 recommendations go even further, suggesting these databases and information should be publicly accessible.

While there are some reputable global disaster loss databases such as EM-DAT, NatCat from Munich Re, Sigma from Swiss Re and others,[69] it is important to note that any reporting process to the Sendai Framework Monitoring system has to be based on officially endorsed data, collected and validated by national governments. This data should comply with the requirements of the Sendai Framework. It should address small- and large-scale disasters, and slow- and rapid-onset events, cover a large number of hazards (including man-made hazards) and, most importantly, record data for a set of global indicators, some of which were not available in the global loss databases.

Furthermore, for effective implementation of the recommendations of the Sendai Framework, databases should be built gathering geographically disaggregated data that has to be usable at a subnational scale. As a minimum, data in the disaster loss databases should be disaggregated by event, hazard and geographic area. Aligning loss databases with the SDG principles, countries are encouraged to pursue even higher levels of disaggregation (by recording differences in socioeconomic impacts based on sex and gender roles, household level, etc.). People experience disasters differently, even within the same household. Traditional measures are not able to capture these variations because metrics stop at the national, subnational or even household level. While data remains sparse, there is evidence that women and

69 (Centre for Research on the Epidemiology of Disasters 2018)

children are disproportionally affected by disasters in some – but not all – countries. Therefore, more surveys are needed to capture the underlying risks that can include, but go beyond, gender and age divides and inform policies on such disparities.

Box 9.1. Methodological aspects of statistical analysis of the first reporting years: outliers, and statistical strength in trends and recommendations for further research

The first review showed the need for more detailed, well-structured disaster loss databases at the national level, to enable measurement of outcomes under Targets A–D. This will be an area for focus on capacity-building and institutional coordination at the national level in the coming years. Such systems are valuable tools and data sets in their own right; they will contribute to a better understanding of risks and disaster impacts globally and at national level.

Methodological advice on disaster data and trends

Trend analysis is susceptible to manipulation to obtain desired results, especially when the data being analysed contains either highly dispersed values or outliers (i.e. data points that are much higher or lower than average). When data series contain dispersed values or outliers, there is high uncertainty that must be accounted for when analysing trends and reaching conclusions.

For example, patterns of economic loss from disasters may show a general trend towards growth or decrease over a certain period, but this pattern could be driven by the occurrence of large-scale disasters near the beginning or end of the series. In many respects, infrequent large-scale events can be viewed as outliers, compared with extensive risk events that are at a smaller scale, recurrent, more frequent and show more solid trends. Changing the number of years displayed, and including or excluding these outliers, can result in trends that look markedly different.

Good statistical analysis requires data covering an appropriate period. In general, the longer the period of the data sample, the more reliable the conclusions (and the lower the uncertainty). The Sendai Framework targets specify a period of time that starts in 2005 and carries on until the end of the period of the Sendai Framework in 2030 for analysis. The initial period, from 2005 to 2015, referred to as the baseline, is suggested for Targets A and B, but it is highly recommended that Member States produce data for all four loss-based targets over the baseline period.

Nevertheless, a period of 10 years (the baseline) or even the full 25-year timespan for the reporting exercise of the Sendai Framework are still short periods of time, which will probably not provide enough statistical strength to determine trends in a conclusive manner.

Another factor that deeply affects the quality of a trend analysis is the quality and completeness of all the data points across the sample. Unfortunately, in the case of the baseline, countries will need to conduct historical research going back in time to 2005, at the minimum, and ideally even further back, to reduce the uncertainty of the analysis. Gathering all this past data on the quality and completeness will be a challenge for Member States. In many cases, no data collection was put in place that would guarantee homogeneous gathering of all the data required.

Outliers and misleading trends

Outliers must be taken into consideration when analysing trends, as a large-scale disaster can happen at any time and the reading of the data may completely change. This is particularly true for earthquakes. As a result, upward trends are more likely to be found if the outlier is in recent years; equivalently, downward trends are more likely to be found if the outlier event happened in earlier years.

Missing data in earlier years and upward trends

Trend analysis depends on the length of period being analysed, which should be as long as possible. In cases where quality of data is a challenge, taking a look at shorter periods of time when data availability and quality is better, might result in a more reliable analysis. Missing data points are more common in earlier years. Therefore, by taking absolute values by year, upward trends may be found that are the result of more data points being available in recent years. For example, data quality and coverage have a significant effect on determining trends of losses. In this case, recognizing that not enough good data exists for the years under review, thus underestimating losses that occurred far in the past, makes more recent losses appear relatively higher.

From the perspective of the international community working towards reduction of disaster losses, the need for data triggered by the Sendai Framework and the SDG monitoring processes represents a unique opportunity to build a bottom-up global disaster loss database. This would catalyse the process of global consolidation of data required to assess the progress in achieving the targets and consolidate a holistic, solid, evidence-based framework for DRR. From a country perspective, national disaster loss databases increase the capacity of countries to understand their risks and provide a solid evidence base upon which to assess and address their disaster losses and impacts, particularly those associated with climate and weather-related hazards. More specifically, loss databases may help to significantly improve the understanding of how disasters and risks affect the most vulnerable and could be a basis for better understanding trends in climate variability impacts and their true magnitude. The common aspirations of the global, national and subnational disaster risk community call for a better structured, effective, coordinated and harmonized way of collecting disaster loss data, alongside corresponding reporting

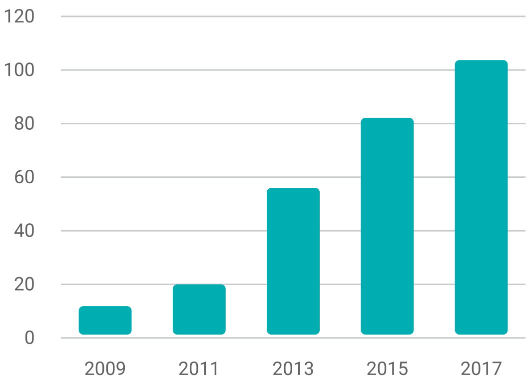
The landscape of disaster loss data is complex, as countries follow disparate approaches to collect, code and analyse data. Recent studies of the JRC Working Group[70] show that within the European continent, there are disparities in the types of data indicators, thresholds, hazards and resolution of data collected (which may range from building or asset level to national aggregates), including data-collection procedures. For example, some European countries collect data at the building/asset level for the purposes of compensation. In Spain, compensation from official funds in data is collected by the Defensa Civil Española, or in France from insurance policies with data collected by l'Observatoire National des Risques Naturels. Other countries such as Australia and Canada have developed property and publicly accessible data sets, with the same caveat of smaller sets of indicators. Those databases that are focused on financial compensation usually lack disaggregated human loss indicators, or even some of the main human loss indicators such as numbers of people injured or made ill.

70 (Marin Ferrer et al. 2018)

Despite the initial expectations that information-rich countries could easily comply with all of the requirements for the Sendai Framework Monitoring system, preliminary evidence demonstrates that most developed countries do not have integrated loss and damage information systems due to the large number of data sources that provide scattered sector or hazard-specific information. Even where national databases exist, they do not always contain most of the indicators required in OEIWG recommendations. Available databases, for example, in Australia, Canada and the United States, or other property loss databases, contain only a limited subset of the indicators proposed; a similar situation has been found in some European countries. For instance, no indicators are collected around critical infrastructure, injured/ill persons or affected people in many of these databases.

In most known loss databases, no matter their origin, software or age, there is little or no disaggregation of human loss data by sex, age or other criteria requested by the SDG data disaggregation work stream.

Figure 9.1. Number of countries covered in the DesInventar Sendai repository, 2009–2017



(Source: UNDDR)

As Member States continue their commitment to build, improve and align these loss databases, a consolidated global data set could be feasible within a few years. UNDDR has already been conducting consolidation exercises with data from a growing number of countries to build the data sets used for analysis posted in GARs. Starting with 12 countries in GAR09, then 21 in GAR11, followed by 56 in GAR13, 82 in GAR15 and now, for GAR19, a consolidated data set contains data for 103 countries.

9.2

Successes and challenges in establishing national monitoring capabilities

9.2.1

Expectations of Member States for monitoring Sendai Framework implementation

To understand the successes and challenges of Sendai Framework monitoring, it is important to put into perspective what Member States are expected to do, in terms of establishing the institutional mechanisms that are required to undertake reporting as well as substantive information to be collected and shared through the system. Though the Sendai Framework Monitoring system has many functions that are common to a standard reporting mechanism related to any area of international development, it also has certain distinctive points owing to the cross-sectoral nature of DRR.

Institutional structure

The first steps to be undertaken in the Sendai Framework monitoring process are to nominate a focal point for Sendai Framework monitoring, select institutions involved in the monitoring process, and define the roles and responsibilities of the selected institutions.

Every Member State is expected to nominate a main focal point for monitoring its implementation of the Sendai Framework and formally inform UNDDR. The focal point then has to undertake a selection of national institutions that will be engaged in the monitoring process. This enhances a decentralized and systematized process of monitoring through data sharing among various ministries and departments. It is also possible for the designated focal point to bring in institutions outside its jurisdiction, if deemed necessary for the monitoring progress. The last step involves the designation of roles to the individuals nominated by the selected institutions. Roles can include:

a. Coordinator: This role is usually assumed by the national Sendai Framework focal point. S/he has the responsibility of setting up national reporting for the global targets, which includes adding institutions/users, configuring metadata, and for custom reporting, setting up nationally determined targets and indicators. (Metadata refers to the additional demographic and socio-economic parameters needed as an input into SFM by each country for calculations to be performed according to the technical guidance for monitoring and reporting on progress in achieving the global targets of the Sendai Framework, for example: currency foreign exchange rate, GDP and population.)

b. Contributor: Representative of institution assigned different indicators as per the area of focus of their parent institution. The main responsibility is to enter data for the indicators assigned.

c. Validator: This responsibility is usually held by the parent institution of the Sendai Framework focal point, but could be held by others as well. It is usually held within the government and at a high level of seniority. Only after a validator validates the data is it publicly available in the online system (under the analytics module).

d. Observer: An optional function that allows the holder to observe and make comments on the data entered. However, it does not come with rights for editing. Hence, this function could be held by any institution within or outside the government.

Technical requirements

Different institutions are made responsible for reporting against one or more of the 38 global indicators or national custom indicators based on the above-mentioned structure. Unlike the reporting process for HFA, there are no established cycles in Sendai Framework Monitoring. However, there are usually two milestones when a snapshot is taken: (a) every March, contributing to the SDG monitoring reporting in HLPF for global Targets A, B, C, D and E and (b) in October for GAR in one year or a stocktake of the reported progress in the other year, for all Targets A–G. In addition, each Member State is expected to develop its own set of nationally determined targets and indicators for implementing the custom reporting. However, the reporting requirements on this are the prerogative of the Member State and can be adjusted according to the needs and requirements of national DRR strategies.

Through a rigorous process of consultation, UNDDR has developed guidelines that are publicly available in all United Nations languages, including information on minimum data sets required, recommended optimal data sets (including disaggregation), challenges, temporal considerations, computation methodology (minimal to recommended data sets) and metadata: contents, methodology and other topics (coverage, representativeness and quality).[71] These technical guidance notes form the basis for the reporting process but allow parameters to be defined within their national contexts.

71 (UNISDR 2018b)

9.2.2

Successes in establishing national capabilities for monitoring Sendai Framework implementation

This section presents the successes that have emerged since the launch of the Sendai Framework Monitoring on 1 March 2018, regarding the scale of reporting, engagement of NSOs, capacity-development efforts, and cross-sectoral, multi-stakeholder partnerships in data collection and monitoring procedures.

Scale of reporting: nothing succeeds like numbers

The success of Member States in developing capabilities for the Sendai Framework Monitoring system can be gauged from the number of countries that have reported since the launch of the Sendai Framework Monitoring until the time when a snapshot of data was taken in October 2018. During this period, 80 countries reported on one or more of the reporting years since 2015. In addition, there are many others who have established the institutional structures described above. A review of these structures shows that 43 of the Member States have three or more ministries and departments to whom one or more of the roles have been assigned in the online system.

In terms of country reporting against at least one target in each of the years, there is an upward trend, with the number of countries gradually increasing from 43 to 75 countries between 2015 and 2017, against at least one target in each of the years.

Engagement of national statistical offices: vital statistics

Monitoring and data collection should be embedded in NSOs and support a culture of evidence-based learning at the national and subnational levels.[72]

As the gatekeepers of social, economic and environmental statistics, NSOs are well positioned to respond to important data needs arising from the Sendai Framework, the 2030 Agenda, the Paris Agreement and other global initiatives.

The integration of metrics for the global targets of the Sendai Framework within the global indicator framework for SDGs provides the opportunity for many of the aspects to be addressed as part of countries' broader follow-up to the 2015 agreements. An appetite for joint analysis and development of applied information has been observed in many countries.[73] Some Member States have brought in NSOs as one of the key contributors in their monitoring system, demonstrating the need for rigorous evidence to respond systematically and consistently to the requirements of the Sendai Framework.

Capacity development for monitoring: mastering the skills

The new Sendai Framework was developed in a consultative manner following calls by Member States for a more robust, comprehensive quantitative framework. As recommended by OEIWG, steps were taken by UNDDR while developing the monitor:

- The overarching finding of the Sendai Framework Readiness Review (a comprehensive survey among Member States) was that almost no country had the necessary capacities and subsequent functions to report against all the targets. In response, the technical guidance notes were developed to serve as a road map in support of Member State data consolidation efforts.
- Countries have been supported by trained personnel since the launch of the monitoring system, with different approaches in each region. The African Union Commission led the charting of a road map through its Africa Working Group on DRR at a policy level. Regional Economic Communities also committed

themselves to supporting their Member States in the monitoring process. In 2018, the Intergovernmental Authority on Development (IGAD) organized an event in June, the Southern African Development Community (SADC) in August and the Economic Community of West African States (ECOWAS) in November. In the Asia–Pacific region, subregional training was complemented at the national level, hosted by the Member States (subregional training involved two to three key officials from focal institutions, including the National Disaster Management Agencies and NSOs, while the national ones brought in representatives from virtually every ministry or department responsible for sharing the required data).

- Development of an online e-training module to support Member States in encouraging self-learning of assigned staff members in their focal ministries and departments. It is designed with the incentive of certification for trained personnel, and will also incorporate refresher courses as required, to ensure that the trainees have cutting-edge knowledge of the periodic improvements envisaged in the Sendai Framework Monitoring system.

Strategic approach to capacity development

The Sendai Framework recognizes a State's primary role in facilitating the achievement of its DRR goal and priorities and highlights the criticality of sharing these responsibilities with other stakeholders and realizing a participatory approach. To support this approach, United Nations Member States have identified a need for implementation support and enhancement of the capacity of institutions and individuals dealing with DRR. Without adequate capacity, it will be challenging to implement the Sendai Framework.

With the aim of guiding sustainable capacity development for Sendai Framework implementation, the UNDDR Global Education and Training Institute began facilitating consultations with Member States, stakeholders and partners towards a Strategic Approach to Capacity Development for Implementation of the Sendai Framework for Disaster Risk Reduction – a Vision of Risk-informed Development by 2030.

Consultations resulted in refinement of language, and Member States and other relevant stakeholders re-emphasizing the driving principles for effective capacity development for DRR, including that efforts are nationally owned and coordinated. Importantly, the strategic approach generalized advice on the capacity-development roles and responsibilities of various DRR stakeholders, provided high-level guidance in six critical areas of need, and validated proposed "anchors" to help strengthen and institutionalize capacity development.

The strategic approach is a guidance document that aims to reflect changes in needs and trends over time, envisaged to capture and share lessons learned, best practices and examples over time. Among the next steps for its implementation are orientation and awareness-raising for all, pilot testing, development of a monitoring, evaluation and learning mechanism for its implementation, and development of capacity development "marketplace" guidance for adaptation at various levels. Capacity development is a long-term process that should be included in the implementation plans of DRR strategies, to effectively support the implementation of the strategy and realize the Sendai Framework.

Engagement of multiple departments and stakeholders: leaving no one behind in monitoring

Sendai Framework monitoring calls for a new way of thinking when it comes to national reporting on DRR. In the HFA era, the national disaster management organization (NDMO) assumed responsibility for submitting the required information in the HFA monitor. The reporting was a centralized

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72 (Peters et al. 2016)
73 (United Nations 2017a)

exercise conducted under the authority of NDMOs. Many NDMOs established an offline coordination process, which, in most cases, involved the National Platform for Disaster Risk Reduction as the multi-sectoral and multi-stakeholder mechanism for coordination in this area of work. However, it was still the primary responsibility of NDMOs to compile the reports and feed into the HFA monitor.[74] SFM provides a different approach to data sharing and information management. It presents the opportunity to assign different roles to various ministries as per the indicators accorded to them for data-collection purposes. For example, while the Ministry of Agriculture could focus on the economic losses of the sector in Target C, the Ministry for Health and the Ministry for Education could contribute data for the related infrastructure in Target D. However, it should be noted that responsibility of data provision must be distributed in a structured manner within established limits to ensure qualitative rigour and timeliness of reporting.

In addition, governments are not the sole producers of data. Private companies, universities and other third-party actors may offer complementary sources of data useful for augmenting or validating the official reporting system.[75] In line with this, several Member States have brought their international and national development partners in as observers or contributors. Building interoperability and comparisons into existing reporting and data-collection systems may also enhance such partnerships for a wide range of purposes supporting global frameworks on sustainable development.[76]

9.2.3

Challenges in establishing national capabilities

This section identifies the challenges that Member States are experiencing in reporting against the indicators of the seven global targets of the Sendai Framework. Challenges relate to data management through sequential phases of collection, validation, storage and analysis, proposed baselines for analysis, as well as overall institutional capacities in monitoring and reporting as they emerge from different country experiences.

Data is at the core of the monitoring process. The United Nations Secretary-General's Independent Expert Advisory Group (IEAG) on the data revolution has suggested nine core principles that should be common to all actors contributing data to the measurement of sustainable development.[77] With regard to the Sendai Framework, the initial years of reporting point to the following challenges:

- **Data availability.** This includes collection practices, organizational culture, data-sharing mechanisms or the lack thereof, cost (e.g. of establishing collection systems, housing data and purchasing data), private sector proprietary concerns and data governance. Critical data gaps exist in specific areas of disaster loss, in all areas of international cooperation, and for many aspects of early warning, risk information and DRR strategies.
- **Data quality.** The implementation, monitoring and reporting of the Sendai Framework and the 2030 Agenda is predicated on the generation and provision of, and access to, high-quality disaster-related data that will allow effective collation, comparison and analysis by Member States and other stakeholders, within a country context, as well as among countries and regions. This will become all the more challenging without the application of commonly agreed methodologies and quality standards. Some NSOs are exploring the integration of open EO data and statistical data in existing decision-making structures.

The complementarity of EO with traditional statistical methods means that EO can offer validation options of in situ data measurements (e.g. survey and inventory data), can communicate and visualize the geographic dimensions and context of SDGs and Sendai Framework indicators, and, where appropriate, provide disaggregation of the indicators.

- **Data accessibility.** Data sharing among government institutions is a cause of concern for several countries. A minority of agencies have a set procedure in place for data access. Even if informal exchanges occur, publication or secondary use may be difficult without official authorization. However, as reflected in the above paragraph on the division of labour among relevant ministries, some Member States are beginning to set up mechanisms of data sharing that facilitate comprehensive reporting in SFM.
- **Application of data.** While sustained investments in data creation and management are necessary, the ultimate value of information is not in its production, but in its use. To ensure the appropriate application of data, there is a need for data to be generated with users in mind. Herein lies one of the critical challenges that Member States face with the uptake of data and translation of information into actionable policies. Data providers often underinvest in operational tools supporting the translation of information and oversee the importance of engaging with those in a position to use data and drive action, thus compromising opportunities for uptake.

The need for collective effort in enhancing aspects of data availability, accessibility and quality has been recognized by some key communities such as NSOs, and national mapping and geo-information agencies. Unless gaps in data availability, quality and accessibility are addressed, countries' ability to ensure accurate, timely and high-quality monitoring and reporting of implementation across all targets and priorities of the Sendai Framework will be severely impaired.[78]

Disaster loss accounting: working behind the scenes

Processes and methods involved in the collection of loss data is a complex task, with the involvement of technical and non-technical inputs, as well as partners from a range of different disciplines. Even though having a disaster loss database has not been made compulsory by the Sendai Framework, a loss accounting system without an event-wise recording of events would lack credibility. Some of the key challenges related to the output-oriented indicators are as follows:

- Not all countries systematically collect disaster loss and damage data, and even fewer integrate this data into official national statistics.[79]
- Several disaster loss databases exist, but they face challenges such as standardizing data-collection processes, missing data, and inconsistent economic valuations of physical damage and losses.[80]
- There is a lack of simple loss data reporting procedures and common language to ensure the standardization of loss data collection, comparability, recording and reporting across countries. Even where loss accounting systems exist, they may be in the non-governmental domain and thus not officially endorsed as required for Sendai Framework monitoring purposes.

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74 (UNISDR 2013a)
75 (Murray 2018)
76 (Migliorini et al. 2019)
77 (Espey 2017)
78 (United Nations 2017a)
79 (Fakhruddin, Murray and Maini 2017)
80 (Fakhruddin, Murray and Maini 2017)

- Most of the countries responding to the Global Readiness Review collect a critical mass of disaster loss data (Targets A–D, more so for A and B). The practice of disaster loss accounting was said to be well established in many countries; however, data sets are typically more available on physical damage and human impact, and less available on economic losses, livelihoods, losses of specific assets and infrastructure, cultural heritage and disruptions to basic services.[81]
- Multiple taxonomies for hazards exist, including the Integrated Research on Disaster Risk (IRDR) peril classification[82] and Cambridge taxonomy of threats for complex risk management.[83] Controlled vocabularies are an essential component of technical data standards, as they provide a precise and agreed definition of what is being measured or counted.[84]
- In relation to classification, among hazard types, a system for naming individual tropical cyclones has been widely adopted only at the international level. At the same time, expansion of a system for assigning unique identifiers across multiple hazard types introduces some challenges (e.g. lack of creation of internationally recognized mechanisms for identifier generation, procedures for reconciliation of identifiers for events affecting multiple countries and adoption of standard operating procedures).[85]
- Lastly, 40% to 60% of countries reporting in the Global Readiness Review felt they could develop a baseline for most indicators for the disaster loss-related Targets A–D, though much fewer could do so for critical infrastructure, disruptions to basic services, losses to productive assets and the housing sector.[86]

Disaggregation of data: more is less

Even though disaggregation has not been made compulsory by the Sendai Framework, Member States are encouraged to provide as much disaggregation as possible against the different criteria established in support of each of the global indicators. The key theme "leave no one behind" recognizes that the dignity of the individual is fundamental and that the 2030 Agenda's goals and targets should be met for all nations and people and for all segments of society. Ensuring that these commitments are translated into effective action requires a precise understanding of target populations. Disaggregation of indicators, where relevant, by income, sex, age, race, ethnicity, migratory status, disability, geographic location and other characteristics is essential in measuring vulnerabilities of affected populations. Aggregated data may mask inequalities within vulnerable groups that, unless disaggregated, will remain hidden to policymakers. Paying closer attention to the differentiated vulnerabilities of people requires data and analysis that zooms in on specific groups in finer detail. Different levels of disaggregation are useful depending on the context. Household data is widely used in examining, monitoring and evaluating the impact of disasters at the microlevel and informing policy development accordingly. Policies and nationwide programmes may necessitate data at the national or regional level, while interventions wishing to alter poverty and vulnerability dynamics at the household level (e.g. elderly, women and children) require data collection at the individual level.

Significant efforts in this regard are being made for the indicators of SDG 1 on poverty eradication. The international household survey network, demographic and health surveys, multiple indicator cluster surveys, as well as regional initiatives such as the Africa Household Survey Databank, the Latin American and Caribbean Household Survey Databank, are promising examples. They offer opportunities for cross-sectoral data collection, tackling the interfaces of systemic global challenges.

Baselines: going back in time

Progress and change can be monitored only if there is a baseline. For example, in the Sendai Framework targets, countries are expected to report on human-related loss data for the period 2005–2015 to enable comparison with data from 2015 to 2030, per 100,000 population. However, the collection of historical loss data will require an investment of time and resources and may not be possible for countries lacking the necessary data infrastructure. The GBD study led by the Institute for Health Metrics and Evaluation is a potential resource to understand trends in disaster-related mortality. It is the most comprehensive worldwide epidemiological study in existence, with a description of mortality from a variety of causes at global, national and regional levels. The extraction of baseline health measurements for some SDGs from GBD is already being explored. Capitalizing on and maximizing use of complementary data sets monitoring disaster loss data is critical for: (a) data comparability and (b) a nuanced understanding of more accurate benchmarks as points of departure if commitments under the Sendai Framework and the 2030 Agenda are to be realized.

Adapting to expected institutional mechanisms

Despite robust steps by many Member States, there is still room for improvement in terms of political recognition and active engagement for improved alignment of the different global frameworks in national planning. It will be necessary to demonstrate the synergies among the frameworks and efficiencies that can be realized in ensuring coordination by integrating, for example, Sendai Framework discussions into SDG data when advising at the country level.

In addition to this, political will and sustained funding is also required to enhance investment in the required data infrastructure. Raising awareness with national and subnational governments on how the different frameworks align is also critical. Given the higher international and political profile of SDGs, the SDG community needs to be sensitized to the Sendai Framework and actively consider coherence with the framework as it advocates for SDG data system improvements. This combination will serve to reduce fragmentation and duplication.[87] The criteria for portfolio development in donors and regional development banks should recognize and reward initiatives designed in ways that deliver progress on multiple resilience goals and targets.[88] Some countries have also set up committees comprising national stakeholders to identify data holders and gaps in data needed, which should be coordinating with SDGs as and where available.

SFM provides an opportunity for a shared approach to monitoring and related reporting. However, given the need for interministerial policy decisions and associated administrative steps, it has not been easy for countries to establish this institutional structure within a short period of time. This has led to some countries reverting back to HFA procedures of soliciting offline information and opting for a centralized data management process. As a result, sometimes the dilemma has been that Member States that did not focus on establishing a decentralized institutional mechanism may have progressed faster in their reporting commitments, while those that put extended efforts into developing the new institutional structure as per SFM may have done so at the cost of a delay in their reporting in the system.

Problems encountered in the first year

SFM is expected to have a lifespan of 12 years. At the time of writing this GAR, it has been launched for about a year. It was launched in a phased approach where different modules were released over time. There was a period of learning as the online tool was rolled out and gained more users. However, nomination of the country focal points has also taken time in many cases, and there has been a high turnover in the focal agencies and their staff, requiring retraining orientation of new staff.

81 (United Nations 2017a)
82 (IRDR 2014)
83 (Coburn et al. 2014)
84 (Fakhruddin, Murray and Maini 2017)
85 (Dilley and Grasso 2016)
86 (United Nations 2017a)
87 (Murray 2018)
88 (Peters et al. 2016)

Over 600 users now have access to the system, with different kinds of roles. However, it cannot be assumed that all users become conversant with the system with equal ease. Even when information is available within the government domain, there is still a period of time needed to ensure its smooth transition into the desired formats of the monitoring system. In fact, to assume the assignment of these roles is a mere technical function would be a gross underestimation. Even if within the monitoring system it is a simple matter of filling a form, in the context of the government's procedural requirements, the efforts and commitment behind it cannot be overemphasized. This is another process that requires dedicated time and must be undertaken at the outset.

SFM is an online tool, and is therefore highly dependent on broadband Internet access. Thus, the differential bandwidth among regions and even countries within the same region, was a fundamental issue, as expected in any online reporting mechanism. Though part of this is a broader challenge of connectivity, the substantial reporting from some of the developing countries is a testament to how they have not let such constraints inhibit their commitment to accountability.

Translation of content into the languages of the United Nations has taken time and has sometimes been conducted in a staggered manner. Moreover, translation is not a one-time phenomenon, as the deployment of each new module (including in multiple languages) requires a similar feedback loop. This enriches the software, making it progressively easier for users to record their data.

9.2.4

Reporting by targets: trying to be on target

There are several target-specific challenges that Member States may be facing while reporting against the indicators of each of the global targets. This requires further technical discussion on those issues that have been highlighted in the technical guidance for monitoring and reporting on progress in achieving the global targets of the Sendai Framework. One of the main considerations OEIWG made in its report[89] was that Member States agreed that countries may choose to use a national methodology or other methods of measurement and calculation to measure the key parameters of individual targets, especially for Targets A–D. However, OEIWG also recommended that countries keep the metadata consistent if the methodology is changed.[90] For the purposes of this GAR, some of the key issues are outlined below.

Target A

As described previously, this target is related to reduction of mortality by 100,000 population in the decade 2020–2030 as compared to 2005–2015. Some issues related to the estimation of mortality are as follows:[91]

- Determining which deaths are relevant and comprehensively attributable to disasters is complex; alongside the direct impact of a hazard on health, there are many indirect pathways to mortality.
- The time periods between the exposure to a hazard and death can vary widely. The disruption of care for chronic conditions and onset of persistent stress can lead to a greater disease burden or deaths that may not occur for months or years after a disaster.
- Data availability is not uniform across the world. WHO regularly receives cause-of-death statistics from about 100 Member States, yet two thirds (38 million) of 56 million annual deaths are still not registered.
- Though all countries are vulnerable to disasters and loss of life, there is generally a higher exposure to disasters and the risk of death in low- and middle-income countries, which often coincide with those lacking vital registration data, further magnifying the data gap.
- Populations are mobile across country borders, causing challenges in accounting; it has been suggested that each death should be counted in

the country where the death occurred, regardless of the nationality of the dead person.[92]

- Most vulnerable people, including illegal migrants, tend to be unrecognized by authorities; thus, the real number would be higher than that reported.
- As reported by some Member States, data disaggregation is a challenge that requires systematic records of disaster losses per hazardous events. In spite of addressing this in the target, it is difficult to obtain baseline data without disaster loss accounting systems from the respective period.

A disaster loss accounting system that records event-wise losses is a critical requirement to make credible information available for Target A. In fact, despite the above-mentioned challenges, Target A had the highest number of countries reporting comparing to other targets. It is also evident that more countries are making concerted efforts in accumulating disaggregated data, even though this was not a mandatory requirement.

Target B

This target is related to reduction of people affected by disasters by 100,000 population in the period 2020–2030 as compared to 2005–2015. Some issues related to the estimation of affected persons are as follows:[93]

- As with Target A, concerns around attribution apply. Target B encompasses scenarios where cascading effects from hazards can develop into significant impacts. A simple assessment approach is critical, as measurement involves drawing information from a wide range of sectors.
- Like Target A, data on injured and ill people can come from existing health indicators that are adapted to target disaster-specific impacts, but clarification is essential of the periods of time used for measurement and the inclusion of secondary illness and injury. Mental health issues, among the most acute health impacts associated with disasters, are a specific area requiring definition within ill- and injured-person calculations.
- Local authorities and international standards need to also account for degrees of damage to informal settlements through GIS and remote-sensing techniques that can assess impacts to the physical environment such as for dwellings and local infrastructure.
- When data for assessing impacts of disasters on affected persons is not available or sufficient, proxies may serve as useful, alternative sources. Proxy indicators for instance, are widely used by the World Bank Group's GFDRR, which has employed PDNA techniques using sector-specific data for employment, agriculture, health, transport and communication, and by FAO using data on agriculture, food security and nutrition.

Given the different forms in which disasters can affect individual lives and assets, countries need to take a multisectoral approach to monitoring and reporting, to foster a broader set of information and strengthen the resultant analysis. Key organizations working on health such as WHO and Public Health England are trying to address some of the health-related issues through extended guidelines for the ministries and departments of health. Critical studying, careful planning and robust systems to improve data analysis across different sectors in health, agriculture and transport can assist building trust in the data, expanding people's ability to use it, so that their needs are at the heart of data-collection processes.

89 (United Nations General Assembly 2016a)
90 (UNISDR 2018b)
91 (Saulnier et al. 2019)
92 (UNISDR 2018b)
93 (Clarke et al. 2018)

Target C

This target encompasses the reduction of total direct economic losses as a proportion of global GDP. Some issues related to the estimation of economic losses are outlined below:[94]

- The definition of global annual losses attributed to disasters omits the substantial losses in productivity and well-being, which lead to economic impact. However, the complexity of necessary assessment protocols is avoided to ensure that indicator calculation is practical and feasible.
- Measurements for assessment of indirect economic losses are less developed and not included in the Sendai Framework. But understanding the cascading impacts of disasters on economic welfare and productivity is critical, particular as drivers of hazard risks changes over time.
- As in the case of Target B, when reliable information is absent, proxies may be useful, but come with the caveat that non-private price indices be used as often as possible; an example of this is reconstruction inputs such as building materials. Noted challenges extend to the application of affected ratios (i.e. amount of damage due to a hazard) that may give binary, categorized (segmented) or continuous (percentage) values in damage ratios. At different periods following a hazard impact, reporting practices should also reflect need, thus requiring assessment protocols providing for a rapid one and a subsequent one, a year later.[95] Estimating losses to cultural heritage is a unique and context-specific challenge. While available guidance proposes assignment for non-movable and movable cultural heritage assets, their value is difficult to disentangle from local connection and (if applicable) tourism-related income. Cultural heritage issues associated with the natural environment further add to this challenge.
- In the Global Readiness Review, the responding countries mentioned that data sets were typically more available on physical damage and human impact, and less available on economic losses.[96]

Though indicators related to economic losses seem to be one of the more complicated ones in terms of methodology and computation, this is the target that is covered most comprehensively by the available guidelines. Moreover, since a large part of the economic losses are borne by high-income countries, these are also the same countries where the penetration of formal insurance mechanisms is high, thus providing more structured information on validation of economic losses. Reiterated efforts and sustained funding are needed to better capture the indirect costs and cascading impacts of disasters for the most vulnerable segments of the world's population.

Target D

This target aims at the reduction of losses to critical infrastructure and disruption of basic services. Some issues related to the estimation of losses are outlined below:[97]

- Clear definitions are key to consistency in reporting on Target D. For instance, there are challenges of measuring disruption due to slow-onset and small-scale disasters.[98]
- Disaster loss data is greatly influenced by large-scale catastrophic events, which represent important outliers in terms of damage to critical infrastructure. UNDDR recommends countries report the data by event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (which can represent outliers in terms of damage) can be included or excluded.
- As national disaster loss databases that have been developed do not necessarily include historical data on damage to railways, ports, airports and other infrastructures, establishing baseline data is a challenge.[99]
- Contrary to recommendations, damage and disruption to infrastructural assets and services can be disaggregated according to the institutional level (e.g. primary or secondary health facilities), rather than based upon size. Such

classifications are in line with practices in public sector risk assessment and private sector catastrophe modelling used to inform insurance products.[100]

For the purposes of the Sendai Framework monitoring, baselines for Targets C and D are not compulsory because the targets, as articulated, do not include a baseline comparison. However, to the extent possible, it is recommended that countries account for data by event, so that complementary analysis can be undertaken to obtain trends and patterns in which such catastrophic events (which can represent outliers in terms of damage) can be included or excluded. As part of Target D, capturing information on critical infrastructure is key for a government, as reducing losses on this infrastructure and these services could lead to reduced losses in other targets, especially Targets A and B.

Target E

This target relates to the increase in the number of countries having national and local DRR strategies, aligned to the Sendai Framework:

- There is an element of subjectivity in the self-assessment of the national DRR strategies because Member States score themselves against 10 criteria related to the Sendai Framework. However, it is similar to the HFA monitor with which Member States are familiar, where there was also an element of subjective scoring.
- SFM can provide a monitoring platform for DRR strategies with defined indicators and targets.
- A focus should be placed on implementation of DRR strategies. As the statutory and regulatory systems vary among Member States, the decision regarding the adoption and implementation of DRR strategies to be included in the calculation has been left to Member States.
- Compared to national strategies, local DRR strategies are far more heterogeneous, vary across countries and local administrative units, and change over time. It is therefore difficult for the national government to track all local strategies without a substantial scheme (e.g. legislation).

Countries are therefore recommended to conduct detailed self-assessment of national DRR strategies and use them as a benchmark against established global targets and indicators. They can then identify gaps for undertaking DRR actions and for other actions.

Target F

This target aims at enhancing international cooperation on DRR. In the Global Readiness Review, for Target F, only 20% (the lowest among all targets) of the countries reported that they have the available data.[101] The provision or receipt of international cooperation for DRR is conducted with subsequent modalities in each country.[102]

The challenges raised by Member States for some of the Target F indicators include:[103]

- Separating DRR components from the overall amount of resources.
- Confidentiality concerns about sharing the requested information.
- Common terminology for "disaster risk reduction actions", "disaster risk reduction-related technology" and "disaster risk reduction-related capacity-building".

94 (Clarke et al. 2018)
95 (Clarke et al. 2018)
96 (United Nations 2017a)
97 (Clarke et al. 2018)
98 (UNISDR 2018b)
99 (UNIS7DR 2018b)
100 (Clarke et al. 2018)
101 (United Nations 2017a)
102 (UNISDR 2018b)
103 (OEIWG 2016)

- While useful to identify DRR actions, the OECD DAC Creditor Reporting System codes do not comprehensively cover DRR-related support to developing countries in terms of sectoral definition within development assistance.
- The methodology for capturing the data for Indicator F-2. This needs to be further developed and clarified, particularly about the option to report as a "provider" and ways in which funding channelled through multilateral agencies should be reported.
- SDG Indicator 17.7.1 does not have an internationally established methodology or standard yet, and a definition of "environmentally sound technologies" is missing from the methodological development for Indicator F-4.
- There is a lack of useful and reliable indicators for science and technology innovation in many developing countries. In addition, there is no internationally established methodology or standard yet for SDG Indicator 17.6.1. on "science and/or technology cooperation agreements and programmes between countries, by type of cooperation".

Target G

This target relates to enhanced capacities for EWSs, risk information and assessment, and pre-disaster evacuation. As with Target E, this target also has an element of subjective scoring based on ranking of hazards and scoring of initiatives undertaken on issues related to EWSs and risk information. Key components of effective MHEWSs include aspects of systematic detection, monitoring and forecasting of hazards, vulnerability and exposure. They also include detailed capacity analysis of the risks involved and appropriate means of communicating risk information from accountable authorities to populations exposed to or at risk at the local level, such that appropriate action to prepare and respond in a timely manner is prompted.

A few issues for consideration are as follows:[104]

- As MHEWSs vary considerably among countries, instead of counting the number of systems, UNDDR suggested a focus on functionality.
- The selection of major hazards to be included in MHEWSs is determined nationally, recognizing that hazardous events differ significantly among countries in terms of frequency, scale and intensity.
- With regard to measuring coverage of early warning information, Member States may wish to examine proxies for the level of "information redundancy", that is, the number and kind of different warning dissemination channels providing the same authoritative warning information.
- In calculating coverage, the number of exposed populations would ideally be used. However, identification and calculation will be challenging, especially for small- and medium-sized hazardous events and for such an event when not everyone exposed is affected. Therefore, UNDDR suggested the use of a proxy, for example, the total population in targeted subnational administrative units.
- As more than one MHEWS could cover the same geography or population, Members States should consider double counting and consistency of information.

Early lessons on MHEWSs highlight that early warning practice can still improve from past experiences and increase its efficiency, at the level of analysis (data collection and risk assessments) and ensuing action (response). National institutions need to exercise strong ownership of the risk assessment and identification steps of the system. There is no single "off-the-shelf" EWS; instead, a variety of practices make the MHEWS design diverse and context specific. International organizations, strengthening local capacities, can have a complementary role by means of promoting national ownership and strengthening national capacities for early warning.

9.3

Support for thematic and sectoral review of progress

Sectoral analysis is required for full reporting under the Sendai Framework. There has already been considerable international cooperation in various sectors. Two examples are given below of such cooperation, relating to agriculture and school safety.

9.3.1

Agriculture sector

Agriculture forms the livelihoods of 2.5 billion people worldwide. Three quarters of the world's poor obtain their food and income from farming, livestock rearing, forestry or fishing. Smallholders manage over 80% of the world's estimated 500 million small farms and provide over 80% of the food consumed across the developing world.[105] With the growing frequency and impact of disasters and extreme events, they regularly face storms, drought, floods, pests and diseases that destroy or damage harvests, livestock, supplies, equipment, seeds and food. Over the past decade, 26% of all damage and loss from climate-related disasters in developing countries was in the agriculture sector.[106] Moreover, the impact of disasters is not limited to the immediate short term. Disasters often undermine decennial development gains, thus making communities increasingly vulnerable and less able to absorb, recover and adapt to future risks.

In partnership with UNDDR, FAO has developed the Methodology to Assess Direct Loss from Disasters in Agriculture, which is used to track progress towards achieving Indicator C-2 on reducing direct agricultural loss attributed to disasters, under Sendai Framework Target C on global economic loss. This new methodology seeks to standardize disaster impact assessment in agriculture. However, it needs to be institutionalized at the country level. FAO has therefore been providing support and building capacity of national institutions for the adoption, operationalization and implementation of this methodology. A growing number of countries across Latin America, the Caribbean, East Africa and Southeast Asia are already adopting this new approach and are becoming ready to report and track their progress towards Sendai Framework commitments to reduce direct loss from disasters in agriculture.

FAO supports countries in reducing risk and strengthening agricultural livelihoods for building resilience to disasters and crises, while remaining context specific and anchored in local livelihoods and food systems. FAO resilience-relevant work is defined around three main groups of shocks: natural hazards, including climate change extreme events; food chain crises and transboundary threats, including pests and diseases and food safety, in alignment with the Sendai Framework broader scope of hazards; and protracted crises, including violent conflicts. Through this holistic approach, FAO is able to address the compound nature of disasters and the interconnectedness of threats.

Improving crisis and risk governance

Agricultural livelihoods can be protected from multi-hazards only if adequate disaster risk and crisis governance is present at all levels through risk-informed legal, policy and institutional systems, as well as disaster and risk management capacities for the food and agriculture-related sectors.

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104 (UNISDR 2018b)
105 (UNEP and International Fund for Agricultural Development 2013)
106 (FAO 2018)

Early warning – early action

Monitoring risk and disasters helps to prevent, prepare and reduce impact. The FAO Early Warning Early Action (EWEA) system translates warnings into anticipatory actions to reduce the impact of specific disaster events. It focuses on consolidating available forecasting information and putting plans in place to ensure government partners act when a warning is at hand. On a global level, early warning sources to monitor the main risks to agriculture and food security are published in the EWEA quarterly report. At a country level, FAO works closely with country offices to develop EWEA systems tailored to local contexts. Implementation is under way in Kenya, Madagascar, Mongolia, Pacific Islands, Paraguay, Sudan and others.

9.3.2

School safety initiatives

The Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector is a multi-stakeholder mechanism composed of United Nations agencies, international organizations and regional networks. Partners are working to ensure that all schools are safe from disaster risks and all learners live in a culture of safety. The work of the Global Alliance is expected ultimately to contribute to a global culture of safety and resilience through education and knowledge, in support of SDGs and in line with the Sendai Framework. It promotes a comprehensive approach to DRR education through the Comprehensive School Safety Framework.[107] This is based on education policies, plans and programmes that are aligned with disaster management at regional, national, subnational, district and local school site levels, whose goals are to: (a) protect students and educators from death, injury and harm in schools, (b) plan for continuity of education through all expected hazards and threats, (c) safeguard education sector investments and (d) strengthen risk reduction and resilience through education.

The Worldwide Initiative for Safe Schools was launched in 2013 by UNDDR in collaboration with partners from the Global Alliance on Disaster Risk Reduction Education and Resilience in the Education Sector as a response to the High-Level Dialogue Communiqué at the 2013 Global Platform for Disaster Risk Reduction. This initiative aims at securing political commitment and fostering the implementation of safe schools globally. The Worldwide Initiative motivates and supports governments to develop and implement national school safety policies, plans and programmes in combination with the three technical aspects of comprehensive school safety. It offers technical assistance and expertise to support interested governments in implementing comprehensive school safety at the national level and promotes good practices and achievements in safe school implementation for replication in other countries and regions.

Partners of the Global Alliance developed different tools and methodology to enhance school safety. For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) promotes a multi-hazard school safety assessment methodology, namely visual inspection for defining safety upgrading strategies (VISUS). The VISUS methodology has a strong component on capacity-building for decision makers, technical staff and universities. It allows them to make better informed decisions on how to prioritize funding for improved school safety and has been successfully tested in seven countries (El Salvador, Haiti, Indonesia, Italy, Lao People’s Democratic Republic, Mozambique and Peru), where the security of more than 500,000 students and educational staff was assessed. UNESCO is working on the conceptualization of an International Programme for Safe School Assessment, through the implementation of the VISUS methodology worldwide.

9.4

Development of national disaster-related statistics

The adoption of common reporting mechanisms for the Sendai Framework and the 2030 Agenda has prompted the international statistical community to support the development of disaster-related statistics and frameworks. The following section examines this work and its repercussions.

Within the context of a globally agreed policy framework and global indicator monitoring systems, governments have given increased attention to disaster-related statistics. As this area of statistics is a new endeavour in nearly all countries, there is a strong demand for technical guidance and sharing of tools and good practices internationally.

Core concepts and indicators for DRR for international monitoring are defined in the Sendai Framework and SDGs, but there is a need to translate the agreed concepts and definitions into specific instructions and technical recommendations for production and dissemination of statistics. Basic requirements for the international indicator monitoring systems include comparability of concepts and methods for measurement across disaster occurrences. These systems depend heavily on coordination and consistency at the national and local levels.

Countries have different practices for compiling data and preparing statistical tables related to disasters, which makes it difficult to make comparisons or conduct time-series analyses covering multiple disasters. The Sendai Framework focuses on risk assessments, mirroring government demands for improving prevention and preparedness efforts. As risk assessments require information beyond operational disaster data, there is a need for disaster measurements and statistics across disasters, times and geographic locations, and for the integration of disaster information with social, economic and environment statistics.

In many cases, disaster-related data is produced outside the national statistical system and is not included in official statistics. NSOs are often not involved in compiling the data. However, considering the traditional strengths of NSOs and the institutional context for national DRM, different roles can be identified for NSOs. These roles can be grouped into two parts:

- Core roles that should be undertaken by any NSO. These reflect typical strengths of NSOs, such as producing time-series statistics and indicators, providing baseline information fit for purpose for DRM, supporting the assessment of social, environmental and economic impacts, etc.
- Expanded roles with additional tasks that could be incorporated into the functions and responsibilities of NSOs. These can include leading impact assessments, coordinating geographic information services and conducting risk assessments. Some NSOs have already implemented such roles.

9.4.1

Conceptual issues

Disaster-related statistics include, but are not limited to, statistics about disaster occurrences and their impacts. Disaster-related statistics also include statistical information used for risk assessment and post-disaster impact assessments, which rely on analysis of a variety of sources of data on the population, society and economy, like censuses, surveys and other instruments used in official statistics for multiple purposes. Geo-referenced

107 (Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector 2017)

statistics on population, businesses and infrastructure support the assessment of the number of affected people and other possible impacts of disasters from natural hazards.

Disaster risk is unevenly dispersed within countries, across the world and over time. Each disaster event is different; it is relatively unpredictable, and creates significant changes to the social and economic context for affected regions. To identify authentic trends, rather than random fluctuations or effects of extreme values, much of the analysis of disaster-related statistics requires a coherent time series and depends on clear and well-structured statistical compilations. This context puts an exceptionally high value on harmonizing of measurement for related statistics over time and, as much as feasible, across countries and regions.

Statistics on impacts of disasters are linked to uniquely identifiable disaster occurrences. Collections of these statistics need to be structured and documented in such a way as to maintain the links to relevant characteristics of the underlying disaster occurrence (e.g. timing, location or hazard type), while also remaining accessible to users as inputs for cross-disaster analyses (e.g. monitoring indicators over time or in models for predicting and minimizing disaster risk). Thus, a basic challenge in disaster-related statistics is to make statistics accessible for use in multiple forms and purposes of analyses, while maintaining harmonized and coherent compilations via structured use of metadata.

The challenge is best addressed through the development, agreement and application of a commonly agreed measurement framework.

Based on the above, the fiftieth session of the United Nations Statistical Commission took place from 5–8 March 2019. In this Session (Report of the Commission subject to editing),[108] the Commission requested the United Nations Statistics Division, ESCAP, UNECE, ECLAC and UNDDR, in consultation with members of the existing regional expert groups and task forces to consider options and modalities for the establishment and coordination of: (a) a formal mechanism under the purview of the Commission to progress a common statistical framework on disaster-related statistics; (b) a network across the expert communities to sustain cooperation, coordination and fundraising for enhancing statistics related to hazardous events and disasters; and (c) report back to the Commission at a suitable time.

The Commission also urged the international statistical community to expand its capacity building efforts in statistics relating to hazardous events and disasters to assist countries in strengthening capacities for disaster management agencies, national statistical offices and other related contributors of official data to meet reporting requirements for evidence-based approaches to achieving national development policies, plans and programmes, and the goals and targets in the Sendai Framework and the 2030 Agenda.

9.4.2

International support for development of disaster-related statistics

There are several international initiatives to support development of disaster-related statistics. Key highlights include: the United Nations Statistics Division Framework for the Development of Environment Statistics[109] with the support of the Expert Group on the Revision of the Framework for the Development of Environment Statistics, and the UNECE Task Force on Measuring Extreme Events and Disasters since February 2015.

At a regional level, ESCAP established an expert group on disaster-related statistics in Asia and the Pacific in 2014. This has produced a disaster-related statistics framework and a technical guideline designed for national statistics systems and applicable at multiple scales. ECLAC has long provided technical assistance and training to countries in disaster statistics and indicators and has now established a Working Group on Measuring and Recording Indicators related to DRR for the biennium 2018–2019.

9.4.3

Leveraging disaster-related geospatial and Earth observation data

The 2030 Agenda requires data to understand needs, to study and define solutions, and to monitor progress. The leveraging of disaster-related geospatial and EO data and tools in the pursuit of SDGs and the goals and targets of the Paris Agreement, NUA and other related agreements is essential.

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) supports country implementation by focusing on guidance setting directions with regard to the production, availability and use of geospatial information within national, regional and global policy frameworks. This will lead to a better integration of geospatial and other key information in supporting the various post-2015 development agendas as well as their national risk reduction strategies and other national plans. Two reports considered at the eighth annual session of UN-GGIM are particularly important as they bring into context the contribution of geospatial information and services for disasters as well as geospatial information for sustainable development.[110]

The Group on Earth Observations[111] (GEO) is an intergovernmental partnership working to improve the availability, access and use of EOs for the benefit of society. GEO has a work programme of over 70 activities, which cover the global priority areas of the 2030 Agenda, the Paris Agreement and the Sendai Framework. Through this work, GEO has brought together the Global Earth Observation System of Systems,[112] which makes available more than 400 million units of data, information and resources.[113]

9.5

Conclusions

Four years after the adoption of the 2030 Agenda and the Sendai Framework, countries have taken bold steps towards meeting the ambitious aspirations of these transformative plans. In their shared quest to achieve the goals, countries are dealing with daunting global challenges: inequality, a changing climate, instability and fast-paced urbanization. Decision makers across the globe need to critically reflect on how their countries, cities and communities can become more resilient while confronting the interrelated risks. These normative aspirations must be matched with implementation and tangible progress by providing the most up-to-date data and achievements so far. More solid evidence is required, but preliminary findings reiterate previous trends on the highest toll of disasters experienced in the most vulnerable segment of the world's populations.

108 (United Nations Economic and Social Council 2019)
109 (UN DESA 2017)
110 (United Nations Economic and Social Council 2018a)
111 (GEO 2019b)
112 (GEO 2019b)
113 (GEO 2019a)

Part II Conclusions and recommendations

Conclusions

Direct losses are only one piece of the puzzle. The impact of disasters needs to be understood more holistically. When disasters hit, indirect effects are experienced in terms of mortality and morbidity, as well as assets, infrastructure, employment and education opportunities that determine the well-being of affected populations. It is necessary to look at data afresh across goals and targets and establish metrics for those dimensions of disaster impacts that accrue to the most vulnerable by going deeper into distributional analysis, moving away from regional, national and subnational data to the household level.[114] Key indicators such as mortality, morbidity, educational attainment and nutrition outcomes should be disaggregated across all metrics wherever appropriate. If it is endeavoured to reach first those who are furthest behind, it is necessary to understand how socioeconomic circumstances affect any given individual's likelihood of being healthy and educated, accessing basic services, leading a dignified life and eventually building back better after a shock.

Open access, validated and interoperable data across the disaster continuum is critical for the development of evidence-based policies. The examples presented above, together with the roll-out of technical guidance notes on Sendai Framework Monitoring, encourage understanding of the cross-sectoral benefits of reporting on progress against SDGs and the Paris Agreement. Increased international attention and targeted funding across different goals is slowly starting to yield results. However, it is critical to maintain momentum and continue to coordinate global and national efforts in terms of taxonomy and comparability across databases moving forward.

This part has demonstrated that while disaster risks are intensifying at a global scale, the collective will to address them has been insufficient. The hope with initial findings is that by assessing the true costs of disasters, prioritization will be placed on the trade-offs inherent in the setting of national planning and budgeting. Given limited capacities and funding on data collection, governments need to decide where they should invest their resources first. By analysing the underlining risks inherent in social, economic and environmental activity and having precise understandings of target populations, policymakers can tailor durable solutions and effective action for their societies.

Recommendations to Member States on improved data collection for Sendai Framework monitoring

- **Connect** data-collection efforts for the Sendai Framework, which should be brought into the realms of official statistics in coordination with NSOs. This can make disaster loss accounting a standard good practice for feeding into Sendai Framework monitoring as it enables event-wise disaggregated data that lends itself to more credible analysis.
- **Invest** efforts on building a strong customized reporting mechanism that focuses on nationally oriented issues and supports the monitoring framework of national DRR strategies in conjunction with NAPs and local-level monitoring of the Sendai Framework.
- **Align** targets and indicators with other countries in the region or with similar geo-political/hazard profile so that spatial comparison can be undertaken if desired.

- **Leverage** the latest research in data science to facilitate the reporting process based on common principles and standards. Meanwhile, it is essential to support the data revolution for sustainable development as recommended by the Secretary-General's IEAG on the data revolution.[115]

- **Invest** in physical infrastructure, especially in the IT sector, to ensure better online reporting and loss accounting at all administrative levels while building capacities in cartography and geospatial data to better record losses through a complementary initiative of in situ and satellite-based monitoring.

- **Build** synergies so that Member States, especially developing and less developed countries, endeavour to engage with resident and non-resident United Nations entities that are custodian agencies for different SDG targets and indicators, to ensure best possible in-country synergies for SDG reporting.

- **Build** partnerships with other stakeholders and expert organizations as a key to enable a strong data-sharing network and comprehensive reporting. To the extent possible, such partnerships should explore multiple uses of the data so that there is a broader demand and intrinsic incentivization for data collection and sharing. Engage with the private sector, for example, the insurance industry, housing sector, chambers of commerce and industry. This is essential for a more comprehensive capture of economic losses.

- **Promote** a data system that is fit for purpose to monitor and achieve SDGs and the other United Nations landmark agreements and help governments to:[116]

    - Manage and govern more effectively, providing policymakers with real-time or near-time information on the quality of services, the welfare of the population and the state of the environment so they can correct their course and change policies to meet changing demands.

    - Monitor historical progress and ensure objectives can be met, track changes over time and help to project where we are headed into the future.

114 (UNISDR 2017e); (Walsh and Hallegatte 2019)
115 (Data Revolution Group 2019)
116 (Sustainable Development Solutions Network 2017)

Eliciting community knowledge to understand the extent of historical floods

(Source: Mark Iliffe)

Special Case Study

Developing urban and community disaster risk reduction plans using collaborative mapping techniques – Dar es Salaam, United Republic of Tanzania

Dar es Salaam, United Republic of Tanzania, is one of the fastest growing cities in Africa. With a current population of 4.1 million, it is projected to become a megacity by 2030. Maps and geospatial information are critical to the development of any city, vital for placing public services and ensuring the safety of its citizens. However, numerous factors add complexity to the security of Dar es Salaam's residents.

These include the rapid population growth from a population of roughly 300,000 in 1970 to that of the present day, unplanned and informal settlement, and a highly variable climatic environment, all of which contribute to a high risk of flooding.[117] Dar es Salaam's institutions have limited technical capacity in terms of skills, training and equipment. This challenge is further compounded by lack of access to existing geospatial information and gaps in data.[118]

In early 2018, heavy rains caused widespread flooding that affected 50,000 people and claimed at least 41 lives. According to official figures, the emergency response and recovery cost to the Government was more than $780,000.[119]

In response to this rising set of challenges, a consortium of local academic institutions and NGOs working with the Tanzanian Commission of Science and Technology, the Tanzania Red Cross Society, the World Bank and community members formed Ramani Huria in 2015. This is a community risk mapping project in Dar es Salaam that is generating substantial amounts of geospatial information. Such information includes land-use, infrastructure and exposure data that directly informs the development of DRM and DRR plans. As of October 2018, Ramani Huria has mapped neighbourhoods covering roughly 3.5 million residents in over 228 communities.

117 (Calas 2010)
118 (World Bank 2017)
119 (World Bank 2018)

The collaborative process informs decision-making at various levels within the city to take actions that can ameliorate urban conditions for the residents of Dar es Salaam. At a community level, the maps are used to inform actions related to drain cleaning programmes and evacuation planning, supporting the establishment of 10 emergency flood response teams, in collaboration with the Tanzania Red Cross Society programme Zuia Mafuriko (Swahili for "Stop Flooding"). At the city level, the mass of geospatial information supports the development of an ex ante plan for emergency declaration, actions, and definitions of roles and responsibilities in the event of a disaster. This is done through the Dar es Salaam Multi-Agency Emergency Response Team, a city-wide, multi-stakeholder initiative that coordinates city- and regional-level response and planning for disasters.

Flooding near Jangwani Bridge, Dar es Salaam, April 2018
(Source: Ramani Huria 2018)

Maps are created through a collaborative process that combines students and community members. This enables technological skills that generate geospatial information to be transferred, historical flood extents to be established, and the community to participate and be informed with respect to disaster plans as a single process. In increasing the capacity for generating and consuming geospatial information, city- and community-level resilience to disasters is strengthened.

Furthermore, the collaborative approach acts as a mechanism to engage and inform community members and local government to simultaneously change behaviour and support community action. For example, the combination of informing community members on the impact of solid waste being dumped into drains and the provision of locally accessibly solid waste processing sites facilitates a reduction in the severity of flooding. At the broader city level, this allows for a streamlined focus on the larger underlying issues and causes of risk.