JRC TECHNICAL REPORT

INFORM Severity Index

Concept and methodology

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INFORM SEVERITY

Joint Research Centre

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Role of the authors

Karmen Poljanšek, as the editor of the report, is responsible for designing the concept, leading the development and the preparation of the report as well as wrote part of the report.

Stefano Disperati, as visiting scientist of the Joint Research Centre, lead a collaboration with the organization responsible for data collection (ACAPS), reviewed and select scientific and technical solutions for the sound methodology, performed the analysis, computed and presented the results, and wrote the report.

Luca Vernaccini, as external consultant, provided support for scientific and technical solutions for the methodology development, performed some of the analysis and wrote parts of the report.

Angeliki Nika, as senior analyst at ACAPS, was responsible for data collection process, support the development of the methodology and prepare an Annex 6 on Data Collection Guidance.

Sepehr Marzi, as external contributor, performed the uncertainty analysis of index on the choice of weights and aggregation process and help to prepare a Chapter 7.2 on uncertainty analysis.

Arthur H. Essenfelder, as external contributor, prepared the code for the uncertainty analysis.

Abstract

This report describes the concept and methodology of INFORM Severity Index. INFORM is a multi-stakeholder forum for developing shared, quantitative analysis, relevant to humanitarian crisis and disasters globally to establish a common evidence base that is of interests of the European Union, UN agencies, donors, other NGOs and research institutions.

The INFORM Severity index is a composite indicator that measures the severity of humanitarian crises against a common scale at the global level. The concept of the INFORM Severity Index is based on three dimensions: impact of the crisis, conditions of people affected and complexity of the crisis. The model of INFORM Severity index is divided into levels to give insight into each of the dimensions to provide a quick overview of the underlying factors defining the severity of a humanitarian crisis.

INFORM plans to be a suite of quantitative products to support decision making in different phases of disaster risk management cycle. It is mostly known by INFORM Risk Index that supports proactive part of crisis risk management framework. INFORM Severity Index will contribute to improved management of humanitarian crisis with quantitative information about their severity. It will be helpful for an objective analysis of the factors determining the severity of a crisis and trends in crisis severity over time, to make decisions about allocating the required resources as well as being a valuable tool for coordinated actions focused on improving transparency and accountability of the response.

1 Introduction

Humanitarian needs generated by crises touched a peak in 2019 with nearly 132 million people in 42 countries around the world requiring assistance (OCHA, 2019). Such figure is the outcome of a combination of sudden onset crises with long term, protracted emergencies. As result, the average length of the humanitarian crisis in which there is a UN-coordinated response increased from 5.2 years in 2014 to more than nine years in 2019, implying that nearly three quarters of people targeted to receive assistance in 2018 are in countries affected by humanitarian crisis for seven years or more.

To deliver assistance in such complex scenario, the humanitarian system must be more effective than ever at identifying the groups in need with an inclusive, comprehensive and prioritized way to respond. To do so, robust analysis of the urgency and severity of needs is a fundamental precondition to provide humanitarian organizations with a shared system to allow response plans to focus more on the extremely vulnerable groups.

INFORM is a collaboration of the Inter-Agency Standing Committee and the European Commission that brings together 28 organizations from across the multilateral system, including the humanitarian and development sector, donors, and technical partners.

In 2014 INFORM initiative provided the international community with INFORM Risk Index (De Groeve et al., 2014), a common framework, methodology, and a product for assessing humanitarian risk concerned with structural risk factors concerned with structural risk factors[1].

This experience developed over the years has been useful also to render the complexity of the crisis situation to be assessed in terms of severity into a simple data-driven, transparent and scientific method. An initial workshop to define the scope, target needs and initiate the conceptualization of INFORM Severity was launched in 2016, with the participation of eighteen international organizations that agreed on developing a shared method to define, measure and compare the severity of humanitarian crises through a partnership and a workplan that was led by a technical working group[2].

The severity of crisis is not a new concept in the humanitarian community and it has been measured in many ways. The main purpose of the development of INFORM Severity index is to create a standard way of conceptualizing the severity of crisis and measure a severity of crisis against a common scale with a strong participation of the INFORM partners.

The INFORM Severity Index is a composite indicator designed to measure the severity of humanitarian crises globally, against a common scale, and on an ongoing, up-to-date and regular basis. It aggregates data from various sources to categorise all crises into five levels of severity. It seeks to communicate the current status of crises in a systematic, objective and understandable way.

The INFORM Severity Index shall in combination with risk, early warning and capacity information:

- lead to a shared and objective understanding of crisis severity,
- contribute to decisions on the allocation of resources in a way that is proportionate with crisis severity,
- justify and advocate for action, especially in the case of forgotten or unrecognised crises, and;
- monitor trends in crisis severity over time.

ACAPS took the responsibility for data collection, data entry and also for the periodic monthly release of the INFORM Severity Beta version launched in January 2019. The purpose of Beta version of the model (named Global Crisis Severity Index, GCSI) was to validate the assumptions made in the first conceptualization of the model with actual data gathered from humanitarian crises and to gather feedback that could inform improvements to the data collection and methodology in advance of the final release.

In 2019/2020, the Joint Research Centre (JRC) of the European Commission, in its role of technical and scientific lead of INFORM partnership, reconsidered the INFORM severity index assumptions and calculation, developed a revised methodology and prepared the guidelines for its implementation following the transparency principle of the INFORM initiative. With the publication of this report, the JRC is responsible for the INFORM Severity methodology, which follows the responsibility already taken by the JRC for the INFORM Risk methodology.

[1] https://drmkc.jrc.ec.europa.eu/inform-index

[2] ACAPS, US Centers for Disease Control and Prevention, FCDO, European Commission Joint Research Centre, IDMC, Karolinska Institute,OCHA

INFORM Severity index will complement INFORM Risk Index into the INFORM Suite. INFORM intends to develop a suite of analytical and quantitative tools to support the decision making at different stages of disaster and humanitarian crisis management cycle, specifically prevention, preparedness and response.

Other relevant contributions to the development of the INFORM Suite came from the interest of the European Commission's Civil Protection and Humanitarian Aid Operations (ECHO) to take informed decisions based on a scientific evidence to prioritize needs, allocate funding, and develop the humanitarian implementations plans.

The European Union is among the leading donors of the humanitarian aid in the world. Therefore, it is fundamental to adopt an evidence based approach for better targeted and more effective use of aid and development resources. Furthermore, it becomes essential to support the INFORM initiative, such open partnership, to play a central role in the development of global, open-source disaster risk assessment and humanitarian crisis assessment in order to contribute to the global efforts to reinforce risk reduction strategies.

The report provides the users with the robust scientific methodology implemented in INFORM Severity. It is considered to be the first version of the methodology as it is expected to be upgraded with the experiences gained through further usage and confronting new situations, feedbacks from the partners and the availability of better data.

This report presents in its first chapters the objectives of INFORM Severity Index, the phenomena portrayed by the INFORM Severity index and its development process. Then it presents the overall logic behind the modelling of the phenomena and existing concepts. It is followed by the conceptual framework of the severity of humanitarian crisis and related definitions adopted in the INFORM Severity Index, the severity calculation as well as scale and scope of the product. It proceeds with in-depth explanation of the severity of humanitarian crises model through the detailed analysis of its key dimensions: impact of the crisis, the conditions of affected people and the complexity of the crisis. The report provides information on the indicators selection and their combination through a sound weighting and aggregation schema. Furthermore, it addresses other relevant methodological issues, strengths, limits, opportunities and risks of the current information product generated by the INFORM Severity model, interpretation of its results and which considerations need to be made when processing the outputs of the model, i.e. to calculate trends.

2 About INFORM

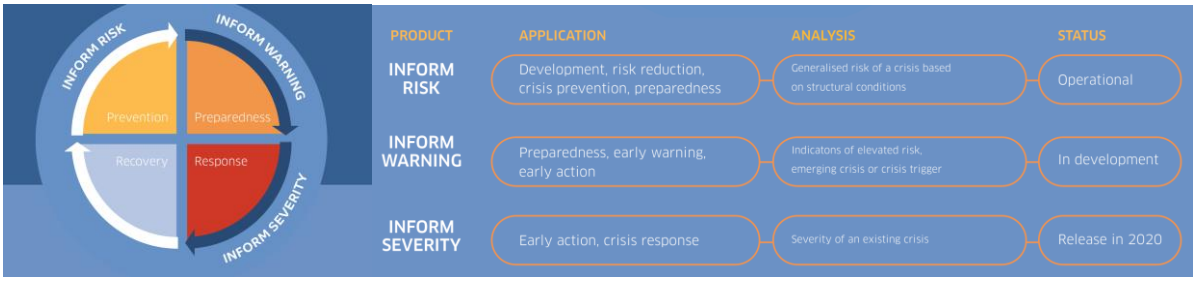
INFORM is a multi-stakeholder forum for the development and share of quantitative analysis relevant to humanitarian crises and disasters. INFORM is a partnership of 28 organization. INFORM is a collaboration of the Inter-Agency Standing Committee and the European Commission. The Joint Research Center of European Commission is the scientific and technical lead for INFORM. It brings together organisations from across the multilateral system, including the humanitarian and development sector, donors, and technical partners.

The partners facilitate the use of their data in INFORM products, provide expert guidance for the INFORM initiative and provide in-kind or financial support.

INFORM is developing a suite of quantitative, analytical products to support decision-making on humanitarian crises and disasters. These products help making evidence based decisions at different stages of the disaster management cycle, specifically prevention, preparedness and response with three products (**Figure 1**):

- **INFORM Risk Index,** providing the structural risk information useful in prevention stage and already in operational stage since 2014
- **INFORM Warning tool**, still to be developed, will provide information on any indication of elevated risk, emerging crisis and crisis triggers needed for preparedness, early warning and early action phase
- **INFORM Severity Index,** providing specific information on severity assessment of different crisis for the efficient response phase.

Figure 1: INFORM is a suite of quantitative products to support decision making in different phases of disaster risk management cycle



Source: Inter-Agency Standing Committee and the European Commission, 2020

INFORM initiative develops methodologies and tools with a global coverage and also supports their application at subnational level.

All INFORM products adhere to INFORM's general principles:

- **Global**: INFORM global products cover 191 countries and subnational products include all parts of the region or country they cover.
- **Open**: all INFORM products are freely available and the methodology and sources are open and transparent.
- **Reliable**: INFORM products use the best available methods and data. INFORM partners have committed to make them available into the future.
- **Flexible**: INFORM products can be easily adapted and included into the decision-making processes of users

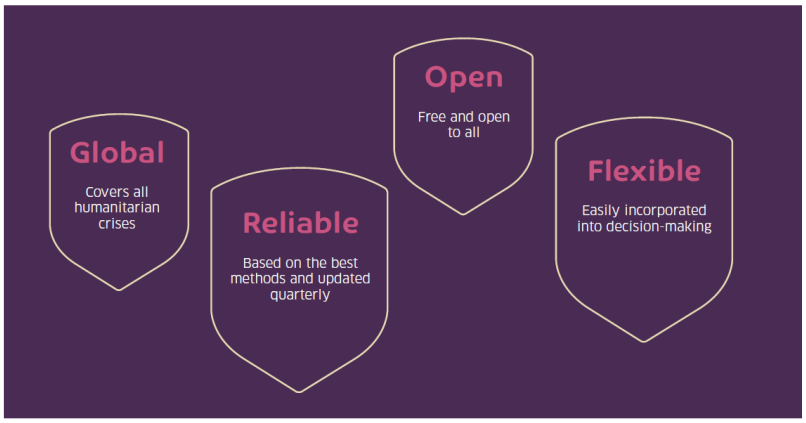
3 About INFORM Severity index

3.1 Objective of the INFORM Severity index

The objective of the INFORM Severity Index is to measure the severity of humanitarian ongoing crises globally and on regular basis. The aim of the INFORM Severity Index is to help communicating the current status of humanitarian crises in a systematic, comparable and objective way.

INFORM Severity index, as any of the tools of the INFORM Suite, applies the INFORM principles (**Figure 2**). INFORM Severity Index is open and transparent, with full access to its methodology, underlying data sources and products. INFORM Severity Index is a tool that provides the overarching principles and processes for the humanitarian community to set a standard in the definition of what "severity" means and on how to measure severity in association to humanitarian crisis. This aims at ensuring that humanitarian organizations, research centres and general public can access, share and adapt the material to their own needs, giving appropriate credit to the INFORM partnership and without using the material for commercial purposes.

Figure 2. Application of INFORM principles to the INFORM Severity



Organizations can use a crisis severity model to:

- Inform a shared and objective understanding of crisis severity – in line with Grand Bargain commitments, specifically on 'strengthening data collection and analysis' and 'supporting joint analysis'.
- Contribute to decisions on the allocation of resources in a way that is proportionate with crisis severity.
- Justify and advocate for action, especially in the case of forgotten or unrecognized crises.
- Monitor trends in crisis severity over time.

3.2 Severity of the humanitarian crisis – phenomena portrayed by INFORM Severity

INFORM Severity index is a measure of the severity of humanitarian crisis at global level: an element that has been identified as key to address existing gaps in the decision-making process of aid organizations in crisis management.

Humanitarian response to a crisis consists of a wide array of type of assistance provided for humanitarian purposes with the primary objective of saving lives, alleviate suffering by meeting humanitarian needs and addressing the human impact of emergencies (European Union, 2008). In the last fifteen years to achieve such objective the humanitarian aid organizations had to activate an increased number of internationally led responses to respond to crisis with an average length that also increased from four years in 2005 to seven years in 2017. The humanitarian needs within several crisis also increased, i.e. with the number of displaced people that grew steady in the last six years, reaching an estimated 68.5 million individuals, bringing the overall

number of people in need of humanitarian assistance in 2017 to 210 million in 134 countries (Development Initiatives, 2018).

The scale of humanitarian needs is placing the aid system under considerable strain with the gap between needs and available resources widened. Funding appeals has almost tripled from EUR 6.8 billion in 2008 to EUR 23.8 billion in 2017, and only an estimated 62 per cent of the 2017 appeals were funded (UN, 2016). The increased trend in humanitarian needs is expected to continue, fuelled by multiple complex crisis, as well as increased frequency of natural disasters caused by climate change. Humanitarian aid is distinguished from the development aid, which instead seeks to address the underlying socioeconomic and governance factors which may have led to, or contributed to aggravate, a crisis. Humanitarian response to a crisis refers to immediate needs in on-going emergencies while development aid ensures preparedness for future events.

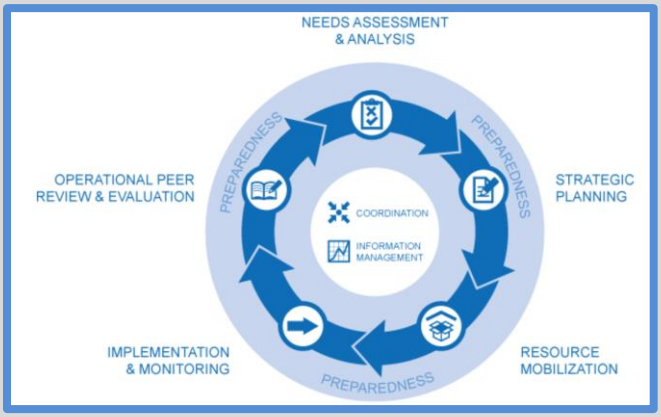
Box 1: Humanitarian Needs overview: first step in a continuous process of humanitarian programme cycle

Humanitarian Needs overview[3] (HNO) is a coordinated approach to the assessment of an emergency and to the prioritisation of the needs of affected people and lays the foundation for a coherent and efficient humanitarian response. Coordinated assessments are carried out in partnership with all humanitarian actors in order to assess the humanitarian situation and to identify the needs of the affected population. Local and national authorities, civil society and affected communities are encouraged to participate in this process which results in a document produced twice per year. This document presents a comprehensive analysis of the overall situation and associated needs.

It provides a shared understanding of the impact of the crisis, including the assessment of the most pressing humanitarian need with the estimated number of people who need assistance and evolution of a crisis. It represents a consolidated evidence base and helps inform joint strategic response planning to support the Humanitarian Country Team (HCT) as well as the baseline information upon which situation and response monitoring systems will rely.

HNO (Figure B1) should form a continuous process throughout the humanitarian programme cycle[4] (HPC) adopted in 2015 by humanitarian system for a more coordinated way to prepare, manage and deliver the humanitarian response. It consists of five elements coordinated in a seamless manner, with one step logically building on the previous and leading to the next. Successful implementation of the humanitarian programme cycle is dependent on effective emergency preparedness, effective coordination with national/local authorities and humanitarian actors, and information management.

Figure B1: The humanitarian programme cycle



The HPC elements are as follows:

1. needs assessment and analysis
2. strategic response planning
3. resource mobilization
4. implementation and monitoring
5. operational review and evaluation.

Source: IASC, 2015

Tools of common use among humanitarian organizations, such as the Humanitarian Needs Overview (HNO) and sector needs assessments (Box 1), provide a detailed analysis of the human needs in terms of number of individuals in needs by sector. Such tools play an important role to allocate resources between and within sectors, and being country-specific, they are not designed to provide comparable contextual analysis.

[3] https://www.humanitarianresponse.info/en/programme-cycle/space/page/assessments-overview
[4] https://www.humanitarianresponse.info/en/programme-cycle/space/page/www.humanitarianresponse.info/hpc

The INFORM Severity index is positioned in the context of these HPC processes and products, where it targets the need for a generalized overview of the level of severity of a crisis. The human needs are essential and prioritized over the impact of the crisis and complexity to operate in the crisis affected area, in order to be consistent with the overall mission of the humanitarian response. Yet, the human needs alone don't explain the overall severity of a humanitarian crisis. The INFORM Severity index provides the capacity to combine human needs with contextual data on the impact that determined the crisis and the operational conditions to deliver the response. Therefore, the INFORM Severity is positioned to incorporate existing information at country-level to provide a global-level decision making:

The INFORM Severity index is designed to convey the following information:

1. **Which humanitarian crises in the world have the highest severity?**
2. **What is the level of severity of each humanitarian crisis?**
3. **Which are the underlying factors determining the severity level of a crisis?**
4. **How does a crisis severity evolve with time?**
5. **When the event becomes a humanitarian crisis?**
6. **When humanitarian crisis is resolved?**

The primary role of the INFORM Severity score is formulated in the first two questions. It serves to compare crisis among each other by their severity. As a composite indicator it is aggregated from many categories and components, each reflecting a different dimension of the phenomena, and their values give the answer to the third question. If the continuity of the monthly releases is sustained, the time series will show when an event met the criteria of a crisis, how the crisis evolve and when it phases out.

Thus this index can be used to

- Better understand where priorities and resources dedicated to operations are in line with the severity of a crisis, including their change over time.
- Evaluate the effectiveness of the response planning.
- Identify crisis that require additional advocacy to increase the scale of response, support allocation decisions, especially in the case of forgotten or unrecognized crises (Commission Staff Working Document, 2019) and for organizations already using the INFORM Risk Index.
- Provide inputs to coordination, i.e. in the context of the IASC to support discussion on response and a better functioning of the protocol on L3 emergencies (IASC, 2012): an independent and objective measure of the severity of a crisis, such as the INFORM Severity Index, provides additional evidence for maintaining the size of an operation by still being able to signal the importance of a severe crisis, even when the response reaches an appropriate size.
- Promote the creation of a capacity analysis among different organizations that can combine their own information on response capacity with a common baseline on crisis severity, in order to take informed decision on the need for scaling up the operations.

Many Donor agencies, e.g., the European Union, deliver humanitarian aid according to the principles of humanity, impartiality, neutrality and independence, as set out in the Lisbon Treaty. However, the scarcity of resources to meet current and future human needs generated by crises, makes necessary to take informed decisions to choose allocation criteria based on evidence. The notions of complexity and severity of humanitarian crisis is acknowledged also by the European Union in programmatic documents, such as the annual EU Humanitarian Budget 2020[5].

In 2016 the World Humanitarian Summit launched the Agenda for Humanity[6] a set of 5 core responsibilities and 24 transformations to better meet people's immediate humanitarian needs, whilst reducing the risk and vulnerability to crisis (WHS, 2016). The Agenda introduced the 'new way of working' for the UN system, and the broader humanitarian and development community, aiming at improving coordination and reduce the work within silos – or information stovepipes. In such a perspective the Agenda stated the key relevance of pooled and combined data analysis for planning and programming processes, along with adopt tools for strengthening effective leadership for collective outcomes. Following the launch of the Agenda for Humanity, the High Level

[5] https://reliefweb.int/sites/reliefweb.int/files/resources/EU_humanitarian_budget_for_2020_to_help_people_in_over_80_countries.pdf
[6] https://agendaforhumanity.org/summit

Panel on Humanitarian Financing proposed the Grand Bargain[7] initiative to address finance gap in humanitarian assistance through an agreement among over 30 major Donor agencies and Aid organizations to increase cash-based programming, local response and harmonize reporting requirements, in order to enable the shift from meeting immediate humanitarian needs to addressing the root causes of crisis.

3.3 Development process

The development of the INFORM Severity Index was initiated and guided by the INFORM initiative (Chapter 2) together with other interested organisations.

The technical development of the INFORM Severity Index has been led by a technical working group including:

- the European Commission represented by the European Civil Protection and Humanitarian Aid Operations (DG ECHO) and the Joint Research Centre (JRC),
- ACAPS,
- the US Centers for Disease Control and Prevention (CDC),
- the UK Foreign, Commonwealth, and Development Office (FCDO),
- the Karolinska Institute and United Nations Office for the Coordination of Humanitarian Assistance (UNOCHA).

The development process (**Figure 3**) included:

- 2016 - a review of existing tools,
- April 2016 - an initial scoping workshop and resulting concept paper,
- December 2016 - a further technical workshop, followed by development of a first prototype of the methodology during 2017,
- Early 2018 - extended testing and adjustment of the prototype model using historical data collected for a sub-set of 26 crises,
- January 2019 - publication of a beta version monthly,
- November 2019 – final technical workshop,
- October 2020 - Finalisation of the methodology and data collection process based on the results of the beta version and user-feedback and published as INFORM product.

Figure 3: Development process of INFORM Severity index

Source: Inter-Agency Standing Committee and the European Commission, 2020

The development of the INFORM Severity Index has taken a set of steps to identify the conceptual framework, to provide a measure, and contextualize the outcome of a humanitarian crisis in the form of its severity:

- Understand the concept of humanitarian crisis and define the phenomenon to model: identify the starting point, or phase in, of the phenomenon, its multiple possible evolutions through time and its termination, or phase out, in the context of humanitarian crisis management or response.

[7] https://interagencystandingcommittee.org/grand-bargain

- Define what the "severity of a humanitarian crisis is" and how to measure it: what unanswered questions targets, and conceptualize a theoretical framework using composite indicators to represent it.
- Test the hypothesis that defined the theoretical framework through an integrated approach:
  - test of the results of the theoretical framework with an independent baseline,
  - test of the results of the theoretical framework with expert opinion,
  - test of the selected indicators normalization, thresholds, and correlation between indicators,
  - test of the model: aggregation method, distribution of results, harmonization of mathematical methods applied throughout the model.

In January 2019 ACAPS launched the INFORM Severity Beta version that was made available through monthly releases to INFORM working group and general audience via ACAPS website, in order to gather comments, remarks and provide a base of data for to validate the assumptions made in the first conceptualization of the model with actual data gathered from humanitarian crises to gather feedback that could inform improvements to the data collection and methodology in advance of the final release. The results of the tests conducted on availability of more than twelve set of monthly data are available in **Annex 3**.

In the implementation phase, Joint Research Centre of the European Commission is responsible for the methodology. ACAPS is responsible for the data collection process. OCHA is the overall coordinator of INFORM.

3.3.1 Methodology vs Data collection process

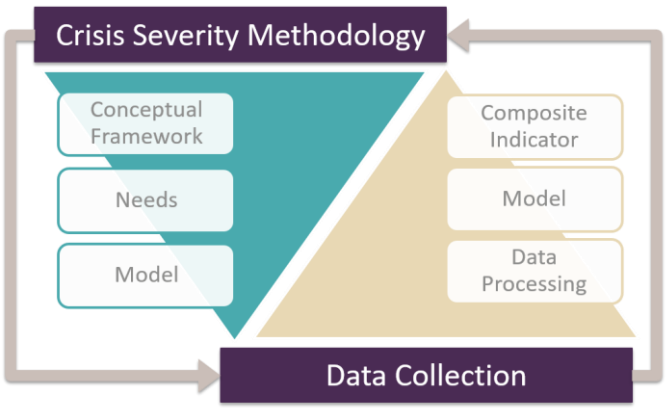
Methodology and **data collection process** are a tandem split among two organizations. If the methodology is top down process, data collection process is bottom up process (**Figure 4**).

Methodology is needed to define a concept and design a respective theoretical framework to provide the basis for the selection and combination of single indicators into meaningful composite indicator under fitness-for-purpose principles. The risk of weak methodology is to:

- observe something that we cannot explain,
- not be able to explain changes in trends and foresee them,
- misuse the data
- not be able to assure comparability among crisis as well as within one crisis over time.

Therefore, the methodological issues and all compromises made need to be addressed transparently prior the construction and use of composite indicators in order to avoid data manipulation and misrepresentation.

Figure 4: Methodology and data collection process



Source: Authors

Data collection process acquires information from different sources, processes them in consistent way to produce core indicators. Since a composite indicator is above all the aggregate of its parts, the strength and weaknesses of composite indicator largely derives from the quality of the underlying variables.

ACAPS as responsible for the data collection and processing has issued the Data Collection guidance (**Annex 6**). Joint Research Centre of the European Commission reconsidered the INFORM severity index assumptions and calculation, developed robust methodology and prepared within this report the transparent guidelines for its implementation.

4 Concept and Theoretical Framework for the severity of the humanitarian crisis

4.1 Existing definitions and concepts

A triplet of terms: crisis, severity of crisis and measure of crisis severity has, in humanitarian context a clear distinction despite the absence of common definition for each of them.

The humanitarian sector is often in need to operate **humanitarian crisis** responses with inadequate resources and facing challenges in taking decisions on how to prioritize and target unmet needs. At the same time, the increasing number of needs assessment activities in most humanitarian responses provides a data rich environment that, can help in taking informed decisions. Gradually, the concept of **severity of humanitarian crisis** and different **measures of crisis severity** condensed in one score have been developed within the humanitarian community and has so far been utilized in functional terms to:

- transform scattered data into meaningful analysis,
- better characterize the levels of unmet need,
- substantiate priorities on aid response and support decision makers and planner to interpret the situation and context,
- increase accountability,
- increase space for collaboration on joint analysis to transform raw data.

Crises or disaster emerges from a severe hazardous events as a result of the combination of hazard occurrence and other risk factors. i.e., exposure, vulnerability and capacity. Hazards may be natural, anthropogenic or socio-natural in origin[8,9]. It is important to know the hazardous event that leads to the crisis to understand the way in which situations are classified, which determines the source of funding, the scale of resources allocated, the form of response, the planning timeframe, and the roles of organizations responding to the needs. There are many definition of humanitarian crisis available (**Box 2**).

Box 2: Current definitions of crisis and disaster adopted by the humanitarian sector

Disaster (UNDRR[10]) is a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts

Humanitarian crisis or emergency (IASC, 2015) refers to a singular event or a series of events in a country or region that cause serious disruption to the functioning of a society, resulting in human, material, or environmental losses which exceed the ability of affected people to cope using their own resources. A crisis may be further classified according to its speed of onset (sudden or slow), its length (protracted) or cause (natural or man-made hazard or armed conflict).

A multi-faceted humanitarian crisis (UNHCR, 2007) in a country, region or society where there is a total or considerable breakdown of authority resulting from internal or external conflict, sometimes compounded by natural calamities and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the ongoing UN country programme.

Humanitarian crisis (Humanitarian Policy Group[11]) is defined by: (a) disequilibrium or set of extraordinary circumstances that marks a significant departure from 'normalcy' (the average); and (b) consequences (immediate needs that endanger or diminish life) that surpass existing or customary response capacities

These definitions of crisis thus mirror the content of humanitarian action itself that it could be articulated as a short-term response to address symptoms that places human beings and human communities and their unmet

8 https://www.undrr.org/terminology

9 The latest UNDRR (2020) hazard definition and classification proposed eight hazard clusters: meteorological and hydrological, extraterrestrial, geohazards, environmental, chemical, biological, technological and societal hazards.

10 https://www.undrr.org/terminology

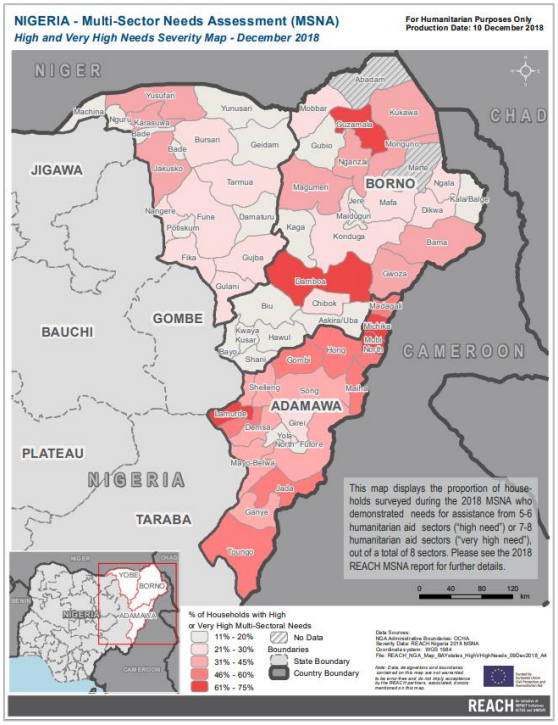
11 https://www.odi.org/sites/odi.org.uk/files/resource-documents/12201.pdf

needs at the centre of crisis response. While proactive approach in crisis risk management instead defines people by their victimhood, their poverty or their helplessness.

Yet, there is not a common definition of severity of humanitarian crisis provided by a major organization traditionally involved in crisis response, such as IFRC, DG ECHO, UNHCR, UNDP, FCDO, USAid. However severity of humanitarian crisis is a key parameter in humanitarian decision making and multiple teams operating in different context of crisis have developed a variety of tools to measure severity.

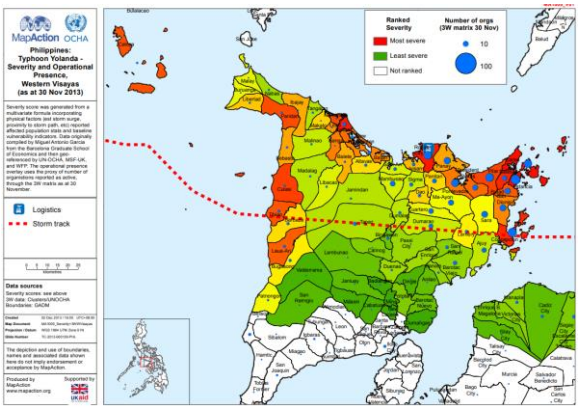
As noted in Benini (2016), "the function of severity measures is to substantiate priorities that, together with parameters like access and cost, guide decisions on the humanitarian response. Severity measures condense, in one number or one verbal scale, elements that influence judgments on priority – elements that are conceptually different, or arrive from separate information sources".

Figure 5. Multi sector needs assessment severity map of Nigeria 2018



Source: REACH Nigeria 2018[11]

Figure 6. Philippines Typhoon Yolanda 2013 Severity Index



Source: MapAction and UNOCHA, 2013[12]

Among existing severity measures in humanitarian domain prevails two approaches:

1. measures that are directly related to the **needs in different humanitarian sectors**[12] (e.g., protection, education, shelter, food security, health, nutrition, WASH, ..) based on rating scales for the person in needs estimates: e.g., multi sector needs assessment (MSNA)[13] done by REACH for different crisis (**Figure 5**);

2. measures that are not strictly covering specific sector and combine indicators on **the magnitude of the hazardous event, impact assessment** (population affected estimates) **and underlying conditions** (mainly the existing vulnerabilities): e.g., the Nepal Earthquake 2015 Severity Index developed the European Commission Joint Research Centre and OCHA[14] or Philippines Typhoon Yolanda 2013 Severity Index (**Figure 6**) developed by MapAction and UNOCHA[15].

12 https://www.humanitarianresponse.info/en/coordination/clusters/global
13 https://www.reachresourcecentre.info/theme/multi-sector-assessments/
14 https://www.humanitarianresponse.info/en/operations/nepal/nepal-earthquake-2015-house-fragility
15 https://reliefweb.int/map/philippines/philippines-typhoon-yolanda-severity-ranking-30-nov-2013

Many of these local severity models are applied at sub-crisis level, i.e., it can geographically differentiate severity within an individual crisis.

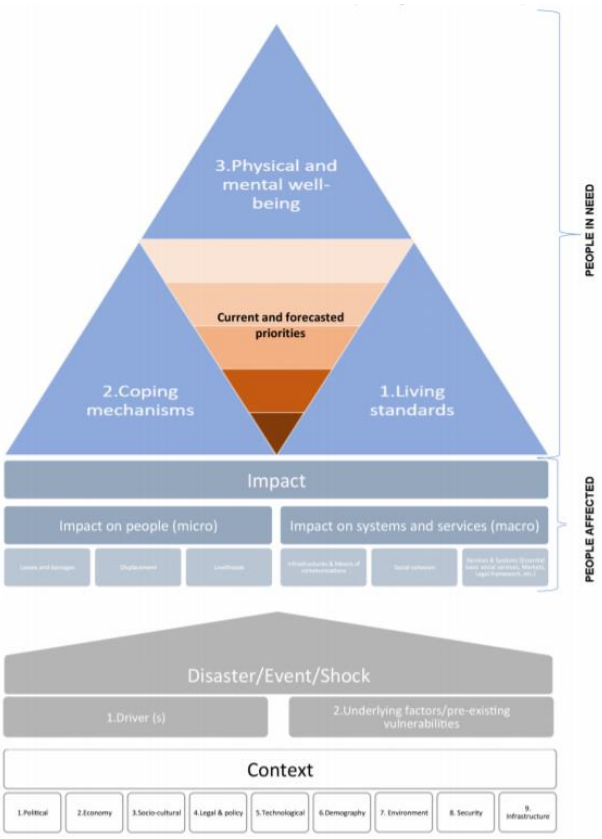
Humanitarian community gradually developed more systematic approaches. One of the first was in the early warning of famine at the UN Food and Agriculture Organization's Integrated Phase Classification (IPC). In 2019, already the 3rd version of IPC (IPC, 2019) was launched. They designed three IPC scales: Acute Food Insecurity, Acute Malnutrition and Chronic Food Insecurity. Each scale classifies a specific condition that is linked to particular responses. For example, in the case of Acute Food Insecurity, food insecurity is found at a specific point in time or a severity that threatens lives and livelihoods, or both, regardless of the causes, context or duration. It requires short term response planning according to a five-phase scale (1-none/minimal, 1-stressed, 3-crisis, 4-emergency, 5-catastrophe/famine). The estimation of severity is constructed in three levels: first level covers food consumption and livelihood change, second level covers nutritional status and mortality and third level considers contributing factors such as food availability, access, utilization and stability, hazards and vulnerability.

Figure 7: Model of Humanitarian Needs Comparison Tool

Process model component	Example domains
Population	Total population
	People affected or in need
	Population subgroups (women, IDPs, refugees, returnees etc.)
Underlying factors	Vulnerable groups
	Baseline indicators
Current status	Inter-sectoral theme or issue (conflict, epidemic, etc.)
	Sector (Health, Protection etc.)
Trends and risks	Disaster risk
	Conflict/security trends
Abilities to respond	Humanitarian access
	Response capacities

Source: UNOCHA, 2014

Figure 8: The joint inter sectoral analysis framework



Source: JIAG, 2018

Furthermore, the Humanitarian Needs Comparison Tool (UNOCHA, 2014) provided even more systematic set of recommendations of individual indicators to include into an overall index of the severity of needs (**Figure 7**). It incorporates needs based information with non-needs based considerations such as underlying factors, current status of the affected sector, trends and disaster risk drivers, and ability to respond, such as humanitarian access and response capacity. The main purpose of such comparison of needs is to provide appropriate contextualization and highlight main differences, similarities and trends to facilitate expert interpretation that can inform a more nuanced analysis of the needs by geographic areas as well as different domains, or current impact vs pre-existing risk conditions. Following the release of the Humanitarian Needs Comparison Tool, severity estimates at country level have been elaborated in several documents of Humanitarian Needs

Overview, like the 2016 HNO for Syria[16], that provided a sector-based seven-level severity scale - from 0-no problem to 6-catastrophic problem.

The severity of needs is also a key output of the Joint Intersectoral Analysis Framework (JIAG, 2018), an initiative by UNOCHA, the European Commission, the Global Cluster Coordinators Group (GCCG) and the Global Food Security Cluster (**Figure 8**). The purpose of this framework is to understand the extent to which the various sectoral needs coexist within the same population groups and/or areas, and how the sectoral needs and associated factors correlate, thereby aggravating - or mitigating - the problem in order to have a humanitarian response plans that are linked to the most critical dimensions of the crisis.

4.2 Concept of the INFORM Severity Index

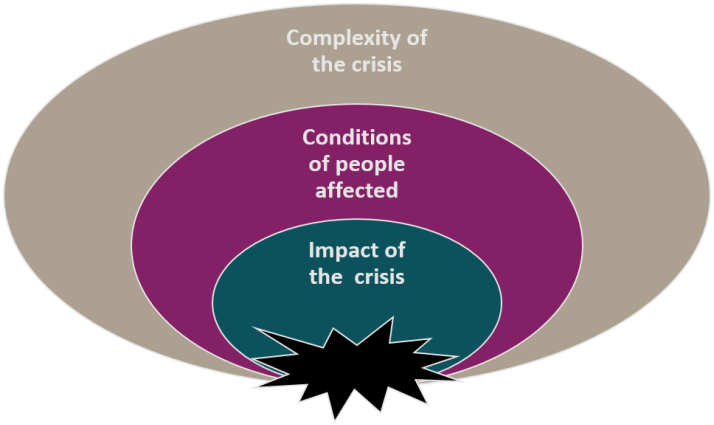
Based on the existing definitions and concepts described in Chapter 4.1, INFORM Severity index model adopted the following definitions of humanitarian crisis, severity of humanitarian crisis and measure of crisis severity:

- **Humanitarian crisis** is an event or series of events that causes harm to the physical, mental, social and economic well-being of a large group of people, exceeds their ability to cope using their own resources, and how complex is to fill such gap by the humanitarian responders.
- **Severity of humanitarian crisis** is an extent of outcomes, in terms of distribution of people affected by the severity of conditions they are confronted within the crisis, generated by the impact of a crisis and worsen by how complex is to deliver humanitarian response in the operational environment.
- **Measure of crisis severity** summarises a wide range of quantitative information about severity of humanitarian crisis and presents it in numerical and/or categorical scale to be easily used in decision making.

The concept of INFORM severity therefore envisages three dimensions of crisis severity (**Figure 9**):

- **Impact of the crisis:** the scope of its geographical and human effects,
- **Conditions of people affected:** information about the distribution of people affected by the severity of condition,
- **Complexity of the crisis:** factors that affect its mitigation or resolution.

Figure 9: Concept of the INFORM Severity



Source: Authors

They are conceptualized in theoretical framework (**Figure 10**) to present the severity of a humanitarian crisis at a certain point in time, depending from the frequency of recent data available. The INFORM Severity Index intends to capture the current situation of the crisis with impact of the crisis, distribution of the people affected by the severity of conditions they are facing together with the context in which the response is going to operate.

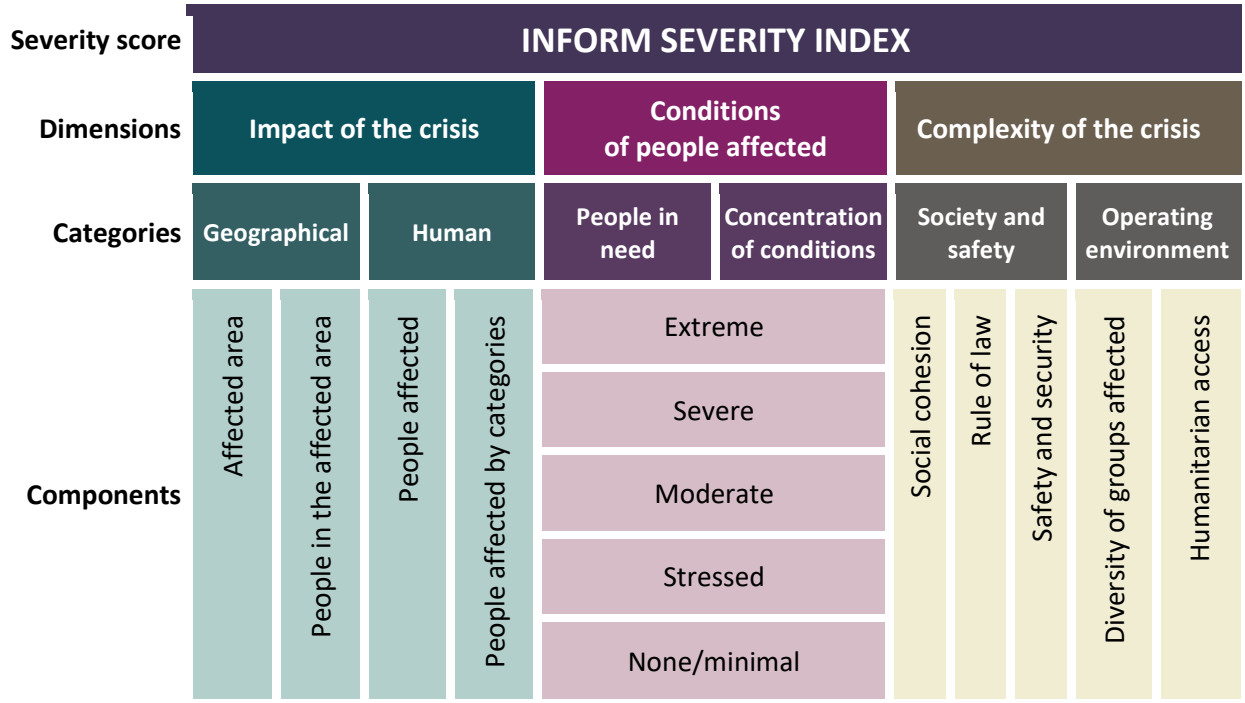
[16] https://reliefweb.int/report/syrian-arab-republic/2016-humanitarian-needs-overview-syrian-arab-republic

The information on the distribution of people affected is highly relevant. Crises having low overall severity might have some people facing extreme humanitarian conditions. People affected by a crisis are not equally affected and they have different levels of needs, which require a different response.

Complexity of the crisis provides the country's openness to accept international humanitarian assistance and describe the complexity of environment in which humanitarian organization would have to operate. It is not only a proxy for all the hurdles that actors would confront but also for the intangible impacts on the population that the crisis might cause.

INFORM Severity index measures crisis severity from first principles (i.e. the effect of crises on people) and is not organised around humanitarian sectors or other response architecture.

Figure 10: Theoretical framework of INFORM Severity Index



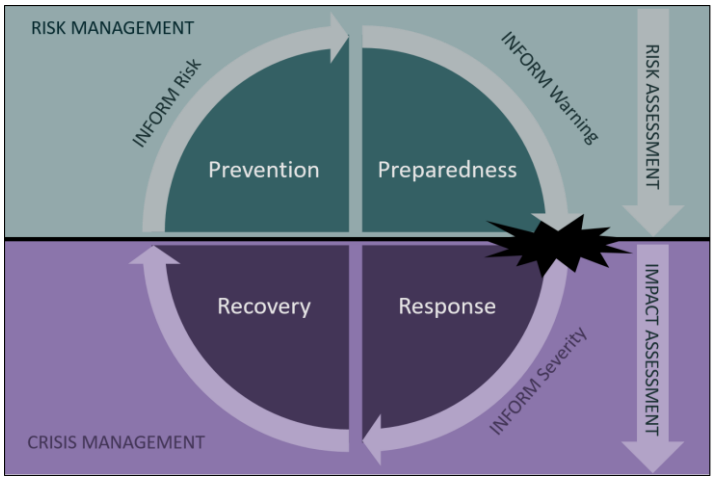
Source: Authors

Risk information is excluded from the theoretical framework which is not always the case in existing concepts (Chapter 4.1). Risk assessment results in potential impact and is related to the future, while impact assessment is related to the past and present time. When the crisis occurs, risk of the crisis is manifested in impacts of the crisis (**Figure 11**). Within this concept, the inclusion of risk information would introduce double counting. Theoretically, the impact assessment reflects a real situation in the affected area of the crisis and this is expected to feed the trend analysis of the crisis evolution and to facilitate the detection of possible effects of humanitarian response activities.

However, there are advantages of risk information not to be ignored. They are used in rapid risk assessments that are undertaken in the initial stages of the event when there is not yet a clear figure of the real impact. Rapid Risk Assessment is used to determine the level of risk associated with a detected hazardous event that might lead to the humanitarian crisis and to define timely response interventions accordingly. In this situation the results of the rapid risk assessment serves to complement or compensate the poor information on impact coming from the field.

Information of underlying risk drivers also gives a broader picture of country's overall or specific resilience in the situation of severe hazardous event which might be a turning point in evolution of crisis. High magnitude event with a high impact might in the country with low risk of humanitarian crises result in quick resolution of a crisis and with a short time span when the severity of the crisis would be high, knowing that low risk is coming from low vulnerability and high coping capacity, Considering such underlying risk factors would add a bit of forecasting notion on the severity of crisis which is relevant for short to medium term of response planning.

Figure 11: A diagram of the disaster risk management cycle comparing the evidences for risk reduction measures to crisis-management measures



Source: Authors

Conceptually, INFORM Severity Index satisfies an increasing need of quantitative information about the crisis severity in management of humanitarian crises. The inclusion of risk information in INFORM Severity Index would blur the purpose of the model especially when other tools are available that can tell us more about the risk, e.g., INFORM Risk Index. The INFORM Severity Index is only one source of information that can support decisions about humanitarian crisis response. It should be in general complemented by risk, early warning and capacity information.

The INFORM technical group therefore proposed that:

- Pre-existent vulnerability is not part of the theoretical framework since it does not contribute to measure the current status of a crisis and should already de facto be included in any assessment of the number of people in need. Other tools, such as the INFORM Risk Index, are more suited to provide a score for vulnerability.
- Capacity for response is not included in the theoretical framework, since it does not directly affect the severity of a crisis in real time. Furthermore, there is no universal concept of capacity to respond, since it depends on the actor/s responding. The model is designed so individual organisations can add a capacity dimension, which is tailored to their own circumstances and decision-making processes.

The experience acquired in developing the INFORM Risk Index, provided valuable inputs for the modelling of the INFORM Severity Index, in terms of operational decisions concerning the components of the model and how to aggregate the different dimensions. **The theoretical framework of INFORM Severity Index is also a multilayer structure** that builds up a score of severity (**Figure 10**). It encompasses three dimensions, each reflecting a different dimension of the phenomena. Each dimension is split into categories that are described by components. Theoretical framework provides basis for the indicator selection to describe each of the component.

This approach is consistent with the documented comparative advantages characterizing the INFORM Risk, and that are meant to bring an added value to the modelling of severity of humanitarian crises:

- Enhanced capacity to analyse the drivers of the final score
- Open source, with a clear methodology and easy to understand for users
- Trackability of the link between data and results

In selecting the indicators, the "3 Rs" criteria apply: relevant, representative, and robust. Indicators are the individual datasets that make up INFORM Severity Index, such as the area affected by a crisis, the access to people in need or the rule of law (**Annex 1**). The indicators utilized may be composite indices themselves. The data used in INFORM Severity Index comes from international organizations and academic institutes and is considered to be the most reliable available.

All levels of the INFORM Severity Index model (from dimensions to indicators) are made available. Therefore, users can explore the severity at different levels of detail and according to their specific needs and interest. The source data that makes up INFORM Severity Index is also made available.

The Severity score is meant to represent the most recent available humanitarian situation: with few exceptions, reports and data from humanitarian crises are not always available with regular pre-scheduled updates, and also the information contained in those reports and data is not always synchronized to a specific time window.

All the above points show how the analytical model is flexible enough to include specific modules, without the need for an overall, global standardization. This flexibility of the analytical model implies a need to prove the validity of the choices adopted to measure severity: indicator standardization, weighting, thresholds and aggregation method, all need a data-driven justification because each step offers alternatives.

The conceptualization phase of the INFORM Severity Index brought to the definition of the theoretical framework of the Severity Score: a construction of the model by its components and hierarchy, meant to simplify the more complex and subjective view of the reality of humanitarian crisis.

4.3 Calculating Severity

Following the definition of the severity of humanitarian crisis (Chapter 4.2) the condition of people affected dimension is essential and prioritized over the dimension of impact and complexity, in order to be consistent with the overall mission of the humanitarian response. Yet, the condition of people affected dimension alone don't explain the overall severity of a humanitarian crisis. The impact of the hazardous event, driver of a crisis, highlights how less severe impacts can generate more sever, if not extreme, humanitarian condition of people affected. Similarly, the access to affected persons of concern can be limited by structural or environmental factors, such as the physical environment or rules and regulations applied in the country determining an aggravating factor to meet the human needs.

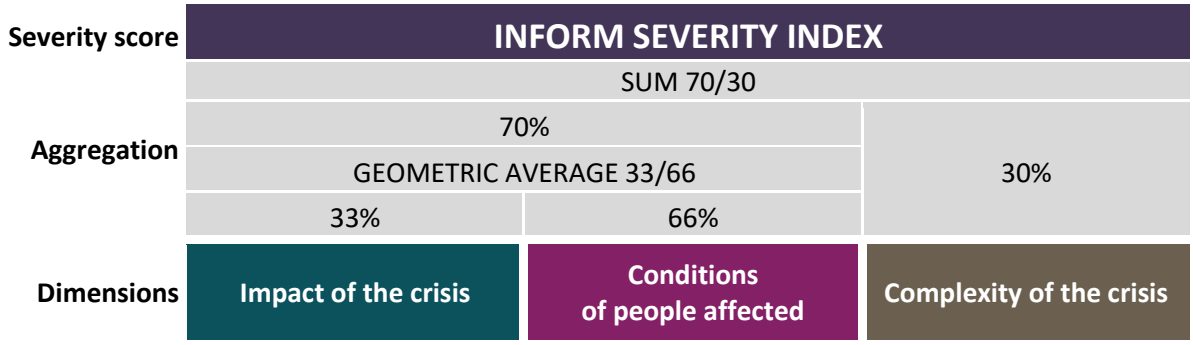
The three dimensions of the INFORM Severity Index are in a mutually consequential relationship. The impact of an event generates different conditions for affected people, in a context that can make it more or less complex to provide assistance to them. This is represented by **Equation 1**.

Equation 1

$$\text{INFORM Severity index} = \text{Impact of the crisis} \times \text{Conditions of people affected} + \text{Complexity of the crisis}$$

A weighting applied at the dimension level is presented in **Figure 12**. The overall severity is therefore most sensitive to the conditions of affected people.

Figure 12. INFORM Severity formula



Source: Authors

High values in the three components lead to worse outcomes and the severity calculated in the equation equals zero if the impact and/or the conditions of affected people dimensions is zero. Conceptually the severity equals

zero, if one of the three dimensions is zero: in absence of an impact there is not a population affected and in need for that specific event. If a crisis is associated with a zero complexity, then it means that there are no impediments of sort to deliver assistance, which can be considered as an only theoretical hypothesis since each country present constraints in terms of either access or intrinsic grades of inequalities that will affect every intervention, either humanitarian or development If a complexity of the crisis has non-zero value it will always have a role of worsening the crisis severity and, consequently, the severity score.

The INFORM Severity score is more susceptible to the conditions of the affected people and the complexity, which are the forces driving the dynamics of a crisis. While, conceptually, the impact, as well as the humanitarian conditions of affected people, play a very relevant role in the phasing in of a crisis in the model, and its effects are defined in a point in time, hence the lower weight

The category of Society & safety is the only in the model that can generate a value even if all the other dimensions equal to zero: the indicators utilized to represent the sub-dimension are rooted in the structure of the society, regardless from the presence of an impact and humanitarian needs.

The INFORM Severity Index is scored between 1 and 5. The low values of the index represent a less severe humanitarian crisis, and the high values of the index represent a more severe humanitarian crisis, where either impact or needs are difficult to be met by the humanitarian response, due to their absolute dimension or by a combination of their volume and the difficulties to deliver assistance to the affected population. The notion that higher is the worse is consistently applied also at dimension, category, and component level.

The whole purpose of severity classification in the form of a hierarchical scale is to systematically identify severity in a consistent manner.

Before the construction of the composite indicator and sub-indices, all raw data values of the core indicators are pre-processed (see **Annex 6** on Data Collection Guidance).

Pre-processing includes:

- Imputation of missing values – using the most recent data available
- Transformation into non-dimensional scales. e.g., utilizing percentages, per capita or density functions
- Re-scaling into range 0-5 with min-max normalization
- At aggregation level, two rules are possible:
    - Arithmetic average
    - Geometric average[17].

Aggregation rules (Box 3) are applied to indexes at each level in order to progress through the levels in a hierarchical bottom-up way, i.e. starting at indicator level and going one by one through the component level, the category level, to the dimension level. In aggregations, **weighting** can be applied to control the contribution of each indicator to the overall composite and should be justified by the theoretical framework.

Box 3: Aggregation methods choice

Different aggregation rules implies different assumption and has specific consequences. For ranking purposes, aggregation is a tool to compensate a deficit in one dimension by surplus in another. The most popular aggregation methods are the **arithmetic and geometric average**. With arithmetic average compensation is constant while with geometric average compensation is lower and rewards more the indicators with higher scores. For a crisis with high and low scores, an equal improvement for low scores will have a much greater effect on the aggregation score than an equal improvement in the high score.

([17]) The geometric average is always smaller or equal than the arithmetic average. To use that characteristic of geometric average, i.e. to reward more those crises with high scores, the following procedure was applied (De Groeve et al., 2014):
1. Inversion of index following the notion higher the better.
2. Rescaling of index into the range [1,5].
3. Calculation of geometric average.
4. Rescaling the score back into the range [0,5].
5. Inversion of the score with the notion that higher is worse.

4.4 Scope and Scale - spatial and temporal

The scope and scale of the composite indicator define requirements for data. When selecting the indicators, the possible scalability in geographical and temporal scale is always considered as an important property.

The spatial scope of INFORM Severity Index is global. The scale is at crisis level (i.e. it measures severity against a common scale for each crisis), It is not applied at sub-crisis level (i.e. it does not geographically differentiate severity within an individual crisis), although the approach could potentially later be applied within individual crises.

Regarding the temporal scale and scope, INFORM Severity Index is to be regularly updated and with sustainable releases, be dynamic to reflect recent changes in severity.

4.4.1 Criteria for inclusion of crises in the Index

A humanitarian crisis phases in the INFORM Severity Index system when both of the following criteria are met:

1. The number of people affected is at least 30,000 people OR the number of people affected is at least 1% of the population of the country.
2. The number of people in need is at least 10,000 people.

A humanitarian crisis phases out of the Index when no updates have been made to the monitored sources for 3 months, e.g., in a sudden-onset disasters, or more (no strict rule) in the case of protracted crises or slow-onset disasters.

The above criteria apply to all types of crises.

The severity value is only calculated when all three dimensions are present. Some crises may be included in the results but the final severity value is not calculated because:

- the lack of data for parts of the Index.
- the crisis don't meet the inclusion criteria but it has "under monitoring" status. Single dimension/categories can be calculated for the crises under monitoring, where data allow.

4.4.2 Type of crisis

Humanitarian crisis can differ by the hazardous event that leads to the crisis and also by the extent of geographical area affected by crisis.

Different hazardous event defines different type of crisis. Hazardous event maybe be natural, anthropogenic or socionatural. INFORM Severity Index covers all **types of crisis** that are listed in **Annex 2**. Among others there is also complex crisis, a type of crises that refers to a crisis in which natural and/or man-made factors interact and overlap making it impossible to isolate their impact into separate crises.

Furthermore, each type of crises can be divided according to the extent of geographical area affected by crisis. Crisis can be:

- **subnational,** which affects one or more regions of a country. The affected area is defined based on the most detailed available administrative level affected;
- **national,** which affects the majority of the landmass of a country and is considering impacting the whole country;
- **regional,** which affects more neighbour countries.

4.4.3 Country level score

The country level score option is meant to provide the overall crisis severity for each country facing at least one individual crisis. It refers to the aggregation of several different individual crises occurring in a country, usually

in separate locations, or affecting different groups of people and due to different factors, which do not overlap and require a specific response. There are two cases:

- When there is only one crisis in the country then this crisis is used to provide the country level score irrelevant on if it's a national or subnational one.
- If there are multiple subnational or national crises a new row will be created to combine the severity to the country level. The country level scores are based on a data collection on country level and not by summarising the individual crisis scores. The reason for this choice is to ensure that all the country level are treated in a comparable way regardless of the geographical and population overlap of the individual crises. For example, there may be multiple crisis within a country that overlap over the same geographical locations or population groups, in this case the country score is calculated by taking the highest number as the value for each indicator in order to avoid double counting. Another case may be that there are multiple crises within a country that affect different population groups in different geographical locations. In this case the country scores are calculated by summing the individual crisis figures for each indicator in the country level.

4.4.4 Frequency update

The updates of indicators are done on the continuous basis. There is no defined update cycle for the indicators. This largely depends on the availability of new data about the actual humanitarian situation, which can vary according to the availability of resources to conduct assessments, the assessment cycle and access to affected people. Indicators are updated as soon as more up-to-date or more reliable information is available. The observed rate of update of the indicators in the twelve months of beta version testing phase is analysed in **Annex 4**.

The release of the INFORM Severity Index is done on monthly basis. Each monthly release therefore represents a snapshot of the most up-to-date and reliable information about the crisis at that moment. A fixed time of release, e.g. on a monthly basis, is a solution that allows users to receive periodically the information and utilize it in pre-scheduled analysis.

Monthly releases of INFORM Severity Index allow to monitor trends in crisis severity over time. As results, the information portrayed on a specific time release is often a combination of data collected and reported with a different time frame that depends from multiple factors like resources available, rapid scale up of needs and or operations, improved access to communities and changes in the tools and methods used to collect data.

The INFORM Severity Index model allows the aggregation of data with different timeframe with a pre-defined release in time, yet it is important to highlight that such capacity of the model requires a careful consideration of the underlying data.

To overcome possible misinterpretations of the release of the INFORM Severity Index, the following criteria apply to the release:

- When data updates are not available the INFORM Severity Index is not updated, and the reference INFORM Severity index is the latest update available.
- When data updates are available the INFORM Severity Index is updated and if the update generated no changes in the INFORM Severity Index of the crisis, then the INFORM Severity index is the same as the previous update.
- When data updates are available the INFORM Severity Index is updated and if the update generated changes in the INFORM Severity Index of the crisis, the INFORM Severity is released.

5 INFORM Severity Index model: dimensions, categories, components and core indicators

The following chapters present the component selection for each dimension and explain the aggregation rules within different levels of the INFORM Severity model.

5.1 Dimension: Impact of the crisis

The **impact of the crisis** dimension reflects the impact of the crisis itself in terms of magnitude (its absolute scale in terms of people or area affected) and depth (its relative scale, i.e the proportion of the population affected in a geographical area). In absence of impact there won't be a severity of the crisis, regardless from how intense the hazardous event is. The dimension comprises two categories: **geographical** and **human**, aggregated with a weighted geometric mean (**Figure 13**).

Figure 13. Dimension: Impact of the crisis

Dimension	Impact of the crisis											
Categories	GEOMETRIC AVERAGE 33/66											
	33%				66%							
	Geographical				Human							
Components	GEOMETRIC AVERAGE				GEOMETRIC AVERAGE							
	Affected area		People in the affected area		People affected		People affected by categories					
Core Indicators	ARITHMETIC AVERAGE		ARITHMETIC AVERAGE		ARITHMETIC AVERAGE		GEOMETRIC AVERAGE					
	Affected area (absolute)	Affected area (relative to the total area of the country)	People in the affected area (absolute)	People in the affected area (relative to the total population of the country)	People affected (absolute)	People affected (relative to the people in the affected area)	Displaced		Fatalities			
							ARITHMETIC AVERAGE		ARITHMETIC AVERAGE			
							Displaced (absolute)	Displaced (relative to affected people)	Fatalities (absolute)	Fatalities (relative to affected people)		

Source: Authors

The **Geographical** impact category is the geometric average of two components "area affected" by the crisis and "people in the affected area":

- Affected area, is defined in the model as landmass affected, resulting from the arithmetic average of the *area affected absolute* (based on the number of Km^2 affected) with the *area affected relative* (based on the percentage of the affected area on the total area of the country)[18].

[18] There are two ways to consider area affected to crisis. The absolute value of area affected will favour more vast countries while the value of area affected relative will reverse the problem and favour small countries. To enable a proper comparison between crisis, in INFORM Severity the sub-component is calculated both ways and then aggregated using an arithmetic average.

- People in the affected area is the result of arithmetic average of *People living in the affected area absolute* (based on the total population living in the affected area), and *People living in the affected area relative* (based on the percentage of population living in the affected area on the total population of the country).

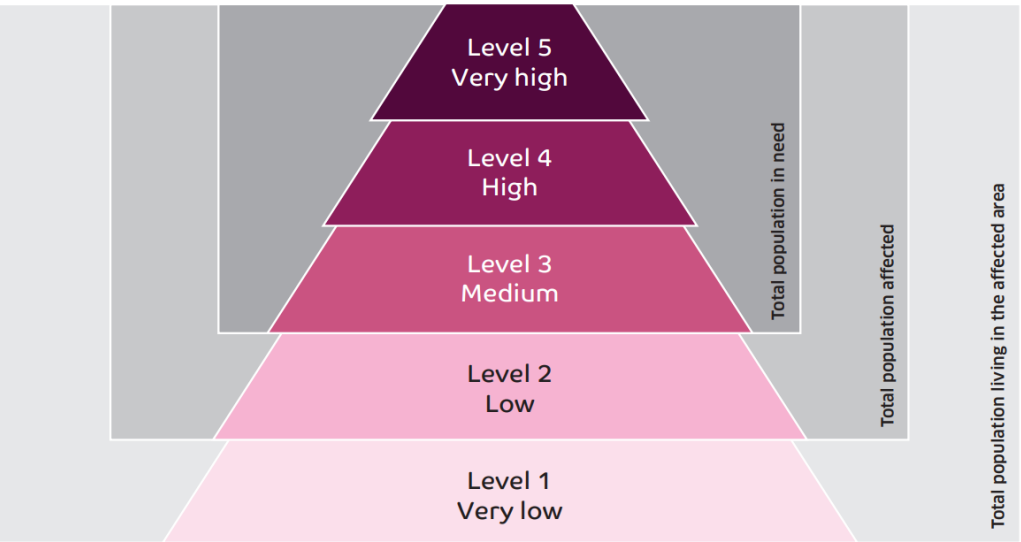
The **Human** impact category is the geometric average of two components "people affected", "people affected by categories":

- People affected is the result of the arithmetic average of *People affected absolute* (based on the total population affected), and *People affected relative* (based on the percentage of population affected on the total population living in the affected area).
- People affected by categories is the result of the arithmetic average of the *People displaced* (the arithmetic average of the *People displaced absolute* (based on the total population displaced (see paragraph 6.3.1)) and *People displaced relative* (based on the percentage of population displaced on the total population affected)), and *Crisis related fatalities* (the average of the *Crisis related fatalities absolute* (based on the total number of crisis related fatalities) and *Crisis related fatalities relative* (based on the percentage of number of fatalities on the total population affected)).

5.2 Dimension: Conditions of people affected

The rationale behind the **conditions of people affected** dimension in the INFORM Severity Index aims at translating information about people in a crisis-affected area into the severity score, through the mapping of different severity categorizations to one common, five-level scale (**Table 1**) representing the number in need and the physical, social, mental and economic effects of the crisis on them, or humanitarian outcomes.

Figure 14. Levels of conditions of affected people used in the INFORM Severity Index



Source: Authors

Table 1: Description of humanitarian conditions by levels

Level 5	**Extreme humanitarian conditions**: People are facing extreme shortages or availability and accessibility problems in regards to basic services. Widely accepted fact that deaths have been reported due to the humanitarian situation, widespread mortality. People face a complete lack of food and/or other basic needs and starvation, death, and destitution are evident; and acute malnutrition is widely reported. They may face grave human rights violations.
Level 4	**Severe humanitarian conditions**: People are facing significant shortages and/or significant availability and accessibility problems in regards to basic services. People face severe food consumption gaps and have started to deplete their assets or already face an extreme loss of assets. This may result in very high levels of acute malnutrition and excess mortality. Presence of irreversible harm and heightened mortality as well as widespread grave violations of human rights.
Level 3	**Moderate humanitarian conditions**: People are facing shortages and/or availability and accessibility problems in regards to basic services but they are not life-threatening. Significant food consumption gaps are visible or people are marginally able to meet minimum food needs only with irreversible coping strategies. As a result of shortages and disruption of services, may face potentially life-threatening consequences if not provided assistance. People may also facing malnutrition. There may be physical and mental harm in populations resulting in a loss of dignity.
Level 2	**Stressed humanitarian conditions**: People are facing some shortages or/and some availability and accessibility problems in regards to basic services. People have some food gaps and food consumption is reduced but adequate are able to meet minimum food needs by applying coping strategies. There are strains on livelihoods. Needs are more increased but are still not life-threatening. There may exist localized/targeted incidents of violence and/or human rights violations.
Level 1	**None/Minor humanitarian conditions**: People are facing none or minor shortages or/and accessibility problems regarding basic services. People are able to meet food and other basic needs without having to apply to irreversible coping strategies. There may be some needs but are not life-threatening.

Source: Authors

All people living in the crisis-affected area are included at Level 1 or higher. The crisis-affected area is defined as part of the data-entry procedure as the most detailed administrative level available impacted by the crisis. All people affected are included at Level 2 or higher. People with identified humanitarian needs are included in Level 3–5, depending on the severity of their needs.

Figure 15. Dimension: Condition of affected people

Dimensions	**Conditions of people affected**									
Categories	GEOMETRIC AVERAGE									
	People in need					**Concentration of conditions**				
Components	Extreme humanitarian conditions									
	Severe humanitarian conditions									
	Moderate humanitarian conditions									
	Stressed humanitarian conditions									
	None/minimal humanitarian conditions									
Core Indicators	People in **extreme** conditions -Level 5 (absolute)	People in **severe** conditions -Level 4 (absolute)	People in **moderate** conditions -Level 3 (absolute)	People in **stressed** conditions -Level 2 (absolute)	People in **none/minimal** conditions -Level 1 (absolute)	People in **extreme** conditions -Level 5 (relative to population in affected area)	People in **severe** conditions -Level 4 (relative to population in affected area)	People in **moderate** conditions -Level 3 (relative to population in affected area)	People in **stressed** conditions -Level 2 (relative to population in affected area)	People in **none/minimal** conditions -Level 1 (relative to population in affected area)

The conditions of people affected dimension consists of two categories aggregated with the geometric average: **people in need** and the **concentration of conditions** (**Figure 14**).

Both scores are coming from the cumulative distribution of people by level of humanitarian conditions. **People in need** (**Table 2**) is based on the absolute number of people (i.e., cumulative frequency expressed in number of people) and is a normalised value of a cumulative frequency of the first three levels. **Concentration of conditions** (**Table 3**) deals with relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%.

This criteria has been inspired by the IPC Framework (IPC, 2019).

Table 2: Definition of people in need category

Level of humanitarian condition	Frequency (# of people)	Cumulative frequency (# of people)	Category: People in need
Level 5 - extreme	F_5	F_5	
Level 4 - severe	F_4	F_5+F_4	
Level 3 - moderate	F_3	$F_5+F_4+F_3$	People in need
Level 2 - stressed	F_2	$F_5+F_4+F_3+F_2$	People affected
Level 1 - none/minimal	F_1	$F_5+F_4+F_3+F_2+F_1$	People in the affected area

Source: Authors

Table 3: Definition of concentration of conditions category

Level of humanitarian condition	Relative frequency (% of people out of population in the affected area)	Cumulative relative frequency (% of people out of population in the affected area)	Category: Concentration of conditions
Level 5 - extreme	R_5	R_5	Score equals to the level with cumulative relative frequency just greater than 5%
Level 4 - severe	R_4	R_5+R_4	
Level 3 - moderate	R_3	$R_5+R_4+R_3$	
Level 2 - stressed	R_2	$R_5+R_4+R_3+R_2$	
Level 1 - none/minimal	R_1	$R_5+R_4+R_3+R_2+R_1=100\%$	

Source: Authors

Box 4. Needs assessment

Needs assessment is often conflated with the formulation of responses, in ways that can lead to resource led intervention. Given the time and resource constraints frequently involved, it may be inevitable that 'assessment' becomes a needs-analysis and a response analysis process rolled into one. Yet maintaining the distinction between these two elements is essential to maintaining objectivity, and to producing results that are comparable and can be aggregated.

Measuring needs involves two elements: the application of relevant norms (usually a minimum requirement or a pre-existing 'normal' situation) and an assessment of how the reality differs. In this sense, needs assessment may be concerned with identifying and measuring deficits, either actual or predicted. The extent of variation from the norm (the deficit or need) will depend in part on what norms are applied, and in part on the degree to which people are able to satisfy their requirements without external assistance.

This model is in some situation inadequate to describe the various situations a given population may face: the situation of a population at risk from epidemic, or from conflict, can only partly be accounted for in terms of a lack of basic needs (for health or security), and these concepts are arguably too broad to be useful except as general descriptions.

A more appropriate approach often taken in needs assessment involves analysis of the specific threats and vulnerabilities involved, and the planning of interventions designed to reduce both, and hence reduce risk.

The scope and nature of humanitarian needs assessments is determined in part by what needs are considered humanitarian in nature. Beyond the normal forms of humanitarian response, the rationale for intervention has to do with maintaining a basic quality of life and protecting the dignity of those affected. There is considerable evidence from the case studies and elsewhere to indicate that the understanding of humanitarian need is to some extent context-specific, at least at the margins.

In Serbia, the largest element of the international humanitarian programme consisted of support to the energy sector. In Afghanistan and in many situations of mass displacement, primary education features in the list of humanitarian activities, sometimes linked to a concern with psychological well-being, dealing with the effects of trauma and establishing a sense of normality amid chaos. In situations of chronic conflict like Afghanistan and northern Sri Lanka, where humanitarian response was for many years the only mode of engagement, it is argued that whole generations will go uneducated if the humanitarian system does not make provision for education.

For some major Donor agencies programmes relating to sleeping sickness and tuberculosis do not fit its criteria for emergency health interventions, being seen as requiring long-term support. Similarly, education, mine clearance, secondary medical care, roads and infrastructure do not qualify for emergency assistance funds. However, there is some discretion to adapt to the situation. In Somalia, i.e. water rehabilitation projects are implemented as part of the humanitarian programs, partly on the grounds that this is considered to fall within a broader objective of conflict reduction and enhancing the environment for peace, as water scarcity is considered a potential cause of conflict. The introduction of such additional criteria is common at the local level, particularly in the efforts by agencies like UNHCR and those working with internally displaced persons to make some parallel provision for host populations on the grounds of reducing tensions between these groups.

Efforts have been made to define universal minimum requirements, the most comprehensive of which is the Sphere Project, which consolidates a number of previous initiative, yet some crucial parts of the humanitarian agenda cannot be adequately defined in terms of need. This is perhaps especially true of the concept of protection, where discussion of the need for protection tends to 'commodify' a concept that cannot be reduced to these terms, and which depends ultimately on the actions of political actors.

Measurements of needs of affected people during humanitarian crises are provided via several tools, such as the Humanitarian Needs Overview, the IOM Displacement Tracking Matrix and several sector needs assessments.

All these tools provide a quantitative estimates of the caseload, often expressed in terms of number of individuals falling into a category of needs by sector.

5.3 Dimension: Complexity of the crisis

Delivering of the humanitarian assistance to people in need requires the understanding of the context in which the response is going to operate, the actors involved, and how physical, environmental and socio-political constraints can exacerbate the outcomes of the crisis.

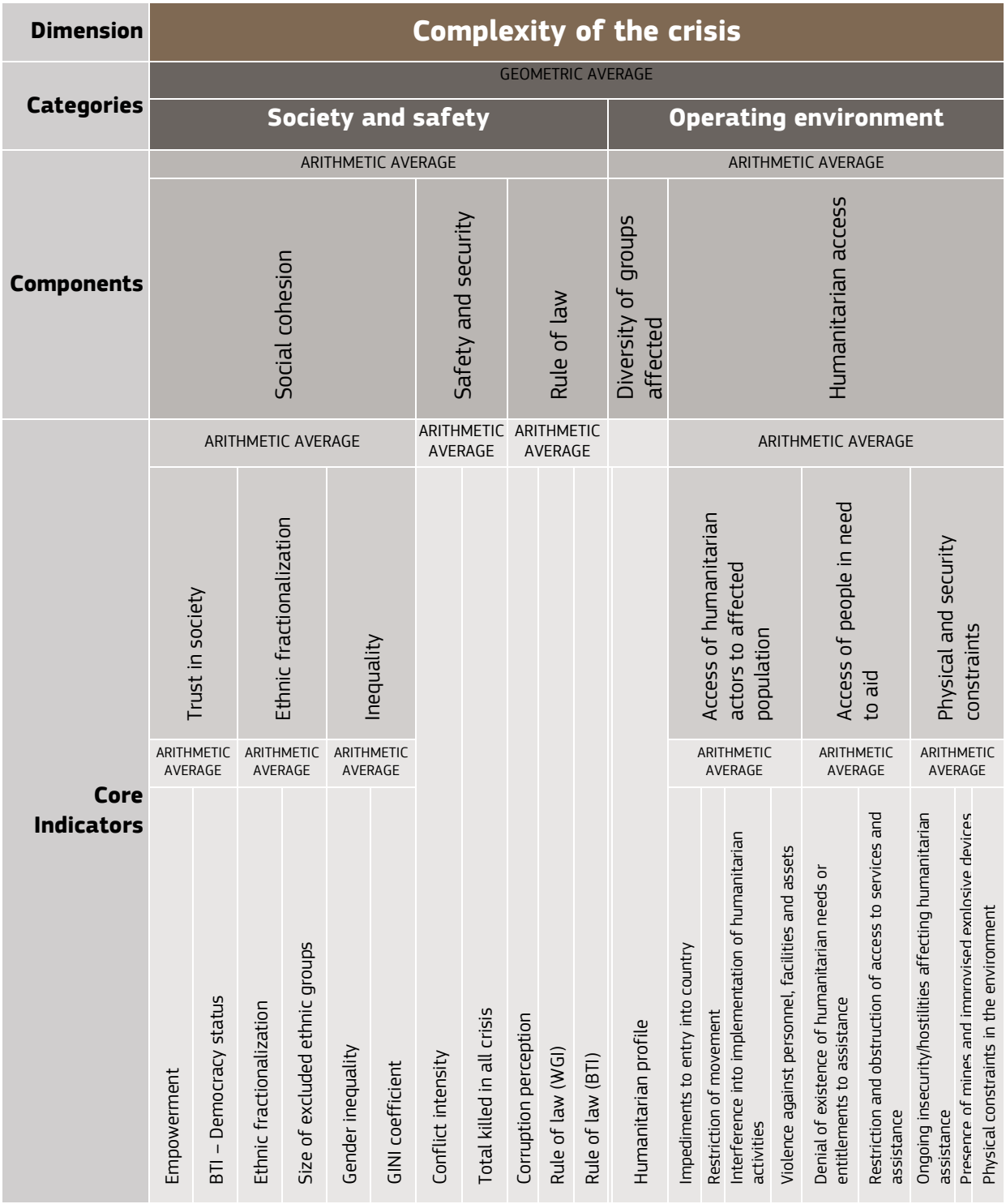
It is a common understanding that affected communities can become unreachable by traditional humanitarian aid delivery due to a combination of factors such as violence, denial of access by local authorities, extreme environmental conditions, physical challenges, infrastructure, corruption, and other reasons, preventing access to the people in need. Moreover, since the length, frequency, and scope of the world's conflicts increase, it is becoming more difficult to reach affected people with consistent lifesaving and life-improving humanitarian assistance.

The **complexity of the crisis** dimension weights 30% on the calculation of the Severity score and is meant to represent the factors that affect the operational environment determining a more difficult mitigation or resolution of the crisis. Two underlying categories are companied with the geometric average: **society and safety**, and **operating environment**.

Components identified provide a description of how complex is to deliver humanitarian assistance in a given context that is the society in which humanitarian actors are going to operate, the conditions determining a legal basis for humanitarian access and the conditions of the operating environment.

The sub-components follow a top-down logic: from the overall society to a more focused attention to the actual affected groups, and further down to a higher level of contextual detail on the actual conditions of humanitarian access to those groups.

Figure 16. Dimension: Complexity of the crisis



The **society and safety** category is determined by the arithmetic average of three components, each resulting from the combination with arithmetic average of multiple indicators (**Figure 16**).

The category aims at describing those elements of the society that can influence the capacity of humanitarian actors to deliver assistance to the persons of concern. Hence the description of the society operated through the selected indicators is meant to focus on the elements underlying the safety of citizens, such as the level of democracy, the relevance of ethnic groups and tribalism that might fuel internal instability, overall gender and economic inequality and different forms of corruption. Such elements are understood to be not enough to define a society, since they might be compensated by several other elements not taken into accounts like the presence

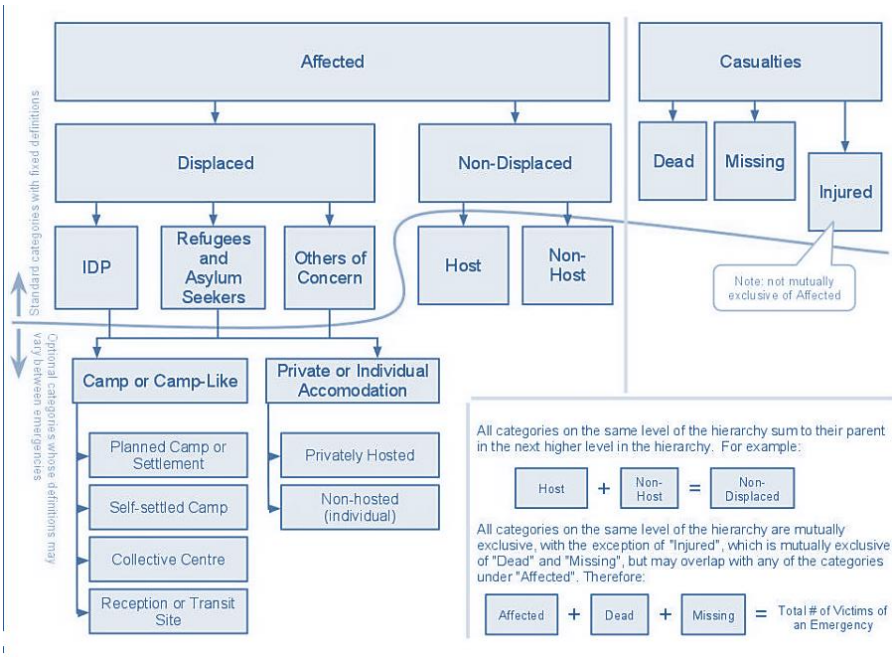
of charities and initiatives from the private sector to reduce inequalities and the effectiveness of compensative justice mechanisms, yet the focus of the analytical framework is on such elements that determines constraints to interact with local societies.

The indicators selected present how the society affects the capacity to deliver humanitarian assistance. They have been selected to allow criteria of redundancy and compensation: two or more indicators are aggregated with a bottom-up approach in order to ensure that each element, e.g., trust in society, is not associated to just one indicator.

The **operating environment** category is determined by the arithmetic average of two components: **diversity of groups affected** and **humanitarian access** (**Figure 16**). This category is compound of contextual indicators in order to focus on the actual limitations set in place during a humanitarian emergency, a direct impact on humanitarian operators, and how diversified is the caseload of beneficiaries according to the IASC guidelines and humanitarian access.

The **diversity of groups affected** component is based on a checklist of different population groups affected by each crisis. This checklist includes: IDPs, Refugees, asylum seekers, and others of concern (such as migrants etc.), Returnees, Host, Non-Host. This indicator reflects the complexity of responding to the needs of the different population groups. The categories used are defined in the IASC Guidelines on the Humanitarian Profile Common Operational Dataset (**Figure 17**). The score equals to the number of different groups. If there are 5 or more groups the score is 5.

Figure 17. Different types of affected population groups, IASC Guidelines on the Humanitarian Profile Common Operational Dataset



Source: IASC Guidelines on the Humanitarian Profile Common Operational Dataset, 2011

Access to the persons of concern is a fundamental pre-requisite to effective humanitarian action, and in situations of disaster or civil unrest the responsibility to ensure humanitarian access lies with national authorities, while in armed conflict the responsibility for the civilian population's well-being lies with all of the parties to conflict. Hence, it is found correct the placement of this sub-pillar in the analytical framework: humanitarian access is the result of the capacity of local societies, or of the groups involved in a dispute to control the society, to guarantee that humanitarian response is able to reach the persons of concern. According to UNOCHA "Humanitarian access concerns humanitarian actors' ability to reach populations affected by crisis, as well as an affected population's ability to access humanitarian assistance and services" (UNOCHA, 2010).

The **humanitarian access** component is a composite indicator developed by ACAPS[19] to provide humanitarian organizations with a detailed analysis of constraints to reach people in need during humanitarian emergencies. The index is constraints by multiple factors represented in the indicators of the sub-pillar: a combination of deliberately obstructive measures put in place by authorities, lack of infrastructures such as roads, topographic or climatic conditions and presence of explosive remnants of war.

Box 5. Methodological notes

Methodological notes and analysis demonstrations developed by the INFORM development team assessments (2013): the note extensively discusses the measurement of severity and priority, the analysis of such data, the differences between ratings and rankings, and the so-called "Borda count" as an ordinal-level measure of priority. It illustrates different data architectures with examples from Yemen and Syria.

http://acaps.org/img/documents/s-severity-and-priority.pdf

Composite measures of local disaster impact - Lessons from Typhoon Yolanda, Philippines (2014): in an extensive review of four "priority matrices" built by responders to this disaster, we demonstrate valid alternatives to unfit ranking methods. The importance of explicit process and measurement models is discussed, with alternative process models and an algorithm for combining multiple indicators in sub-indices which in turn will determine severity.

http://acaps.org/img/documents/c-140527_compositemeasures_philippines.pdf

http://acaps.org/img/documents/c-copie-de-140527_philippines_demodatatset.xlsx

Moderate Need, Acute Need - Valid categories for humanitarian needs assessments (2015): this note discusses the needs concepts and measurements. With data from Syria, it tests the distinction between persons in acute need, those in moderate need and those not in need.

http://acaps.org/img/documents/m-acaps-note-moderate-need-acute-need-valid-categories-for-humanitarian-needs-assessments-aldo-benini-march-2015.pdf

The use of Data Envelopment Analysis to calculate priority scores in needs assessments (2015): DEA is an alternative method to calculate severity measures from indicators of intensity, exposure and vulnerability that relies on data-driven rather than user-defined weights. A demonstration uses data from Syria.

http://acaps.org/img/documents/t-acaps-note-the-use-of-data-envelopment-analysis-to-calculate-priority-scores-in-needs-assessments-aldo-benini-jul-2015.pdf

http://acaps.org/img/documents/d-data-envelopment-analysis---demo-files-jul-2015.zip

(19) https://www.acaps.org/methodology/access

6 Other methodological issues

6.1 Trend analysis in INFORM Severity Index

The monthly releases of INFORM Severity Index will provide valuable inputs to generate trend analysis for the INFORM Severity index and the underlying indexes.

A change in the severity score of the crisis can occur through time, and the crisis will either shift to a higher severity score, or a lower one. The beta version of INFORM Severity Index on a monthly basis over a year revealed a possible issue related with the trend analysis. The rate of update (**Annex 4**) is meant to provide additional support to take informed decision on how a release is representative of the humanitarian situation at that specific point in time.

Changes are related to multiple variations in the underlying data, and is important to isolate the changes related to actual variation in the indicators of the humanitarian situation from changes linked to data cycle, e.g., when a new data source for a specific indicator is utilized to replace a previous source. Such decision can determine a change, real or apparent, in the underlying indicator, and the following information is added at the stage of data entry:

- **First entry**: to be used at the first entry for the source.
- **Update**: to be used when the source in the previous record is kept and a new entry is available (e.g. IOM is the source kept, specifically an IOM Monthly bulletin, and a new release of the same bulletin is available and used to update the figures).
- **Change to a new source**: to be used when the source in the previous record changes, either from a different provider or within the same provider but from a different information product.

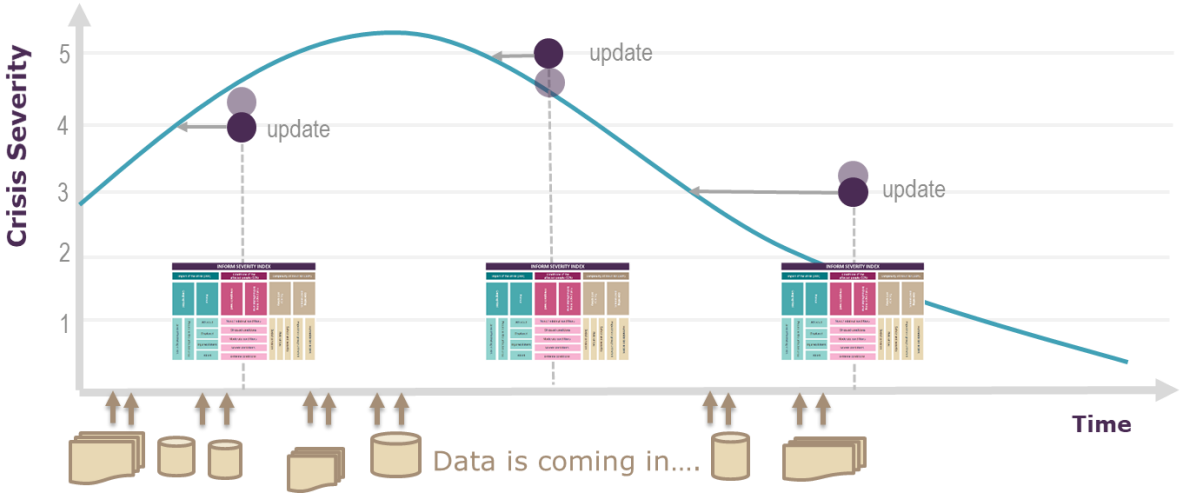
The data entered in the model at a certain time window can be valid for following periods for a specific indicator, since each indicator has its own time-sensitivity. The indicators used in the INFORM Severity Index represent different timeframes and they need to be harmonized at a specific time-window when computing trend analysis. For example, the Humanitarian Access indicator is consolidated at source level every six months, hence when used to calculate a monthly trend for a specific crisis a recalculation to synchronize the results on a monthly basis can bring to more accurate results. It is important to make sure that the timeframe in which the data is collected is clear in order to avoid misinterpretation of INFORM Severity Index at the time of the release.

In calculating and visualizing trend, it is essential to understand the link between the nature of the timeframe of the underlying data with the temporal window utilized for the trend analysis (**Figure 18**).

Two main recommendations are part of the methodology:

- **Timeframe of the indicators**: consider and make clear the influence of different timeframes embedded in the indicators utilized for the trend analysis.
- **Nature of the changes observed in the data**: consider and make clear the changes observed in the indicators in relationship to the changes in the underlying data, their source and any variation in the methodology that brought the data in the model.

Figure 18: Understanding the difference between the timeframe of the underlying data and monthly releases



Source: Authors

6.2 Reliability index

The Reliability index (**Figure 19**) provides the users with an indication of the consistency of the data utilized to calculate the severity score and is meant to increase transparency about the quality of data utilized in the model. Very often the data environment of the different humanitarian crises does not allow analysts to fully trust the data they have in hand. Rather than excluding these crises from the analysis, or imputing missing data, INFORM decided to add a measure of reliability so that users will be aware of such cases.

The Reliability index is calculated by assigning a 5-point scale score (very low, low, medium, high, very high) based on 3 main different elements taken into account:

1. data reliability,
2. how recent the data is and
3. information gaps.

6.2.1 Data reliability

The data reliability variable is calculated by the analysts during the data collection phase by assigning a score on a 3-point scale (low, medium, high). The process of assigning these scores is based on expert judgement and takes into account the following elements:

- Methodology of the data collection: An assessment of the soundness of the data collection methodology if this is known. The analysts consider the quality and usability of the data used.
- Sources/Bias: An assessment of the type of source or sources where the data for this indicator come from.
- Estimations: An assessment of the confidence level on the estimations that are feeding the indicators of the model. An assessment of the assumptions made and the original sources used.

The judgements made are not an assessment of the general value and reliability of the sources. The focus is on how suitable the source in concern is for the specific indicator of the model. A generally reliable source may be dimmed unreliable for a certain indicator especially in situations where most recent data may not accurately reflect the current humanitarian situation. For example if the data collection phase of field assessment took place before a recent development that is believed to have significant humanitarian impact in the said context.

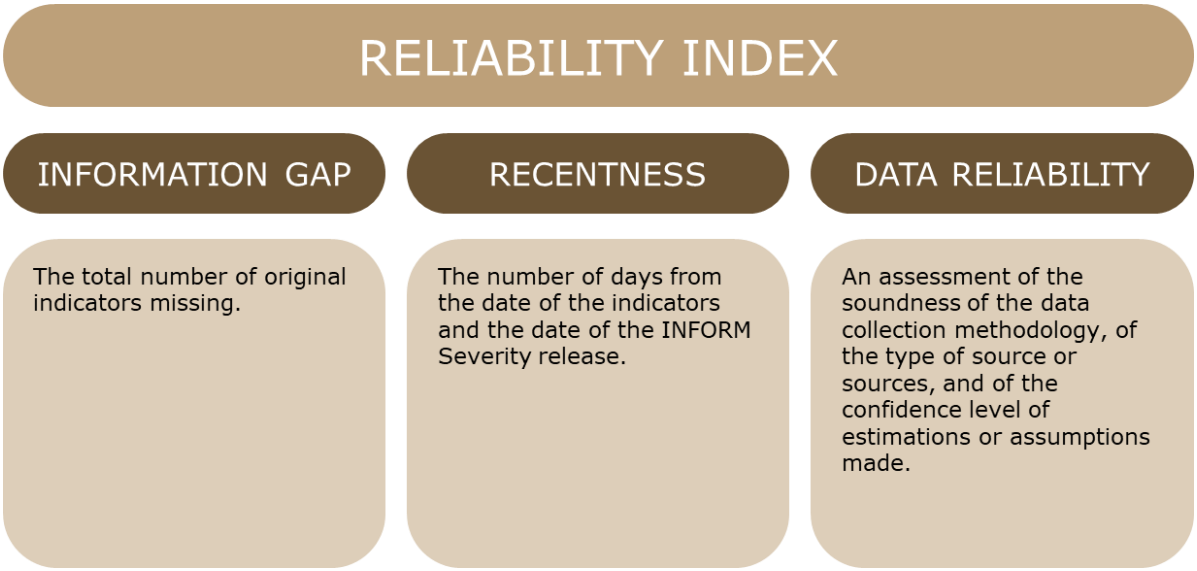
6.2.2 Recentness of data

This variable looks at how recent are the data used for each crisis. The indicator is the time passed between the date of the source and the date of the specific INFORM Severity Index release in days.

6.2.3 Information gaps

This variable considers how many original indicators were available for calculating the INFORM index for each crisis. It uses as indicator the number of missing values, which includes also estimated values not present in the original data source.

Figure 19: INFORM Severity Reliability index



Source: Authors

6.3 Displacement data

Humanitarian crises often generate displacement of people. Millions of people are forced to leave their homes every year because of conflict, violence, human rights violations, persecution, and natural hazards[20]. These could be either internally displaced, refugees, asylum seekers or any other groups of migrants. According to the UN High Commissioner for Refugees, as of the end of 2020, 79.5 million (45.7 million internally, 26 million registered (20.4 million under UNHCR, 5.6 million under UNRWA), 4.2 million asylum seekers, 3.6 million Venezuelans displaced abroad) had been displaced worldwide.

A crisis could occur within the country, while attempting to leave, or while on the move to a safe country, or even after arrival in a country of asylum. A situation can be called a crisis, either from the perspective of the forcibly displaced persons, or from the perspective of the receiving state, or both.

6.3.1 Displacement tracking

The model should enable to track the people displaced because of a crisis, including their status (IDP, refugees, returnees etc.). It is therefore recommended to record separately different types of displacement figures, namely refugees, returnees or internal displaced (IDPs).

[20] https://ec.europa.eu/echo/what-we-do/humanitarian-aid/refugees-and-internally-displaced-persons_en

In particular, incoming refugees are included in the condition of people affected dimension, outgoing refugees are included into human impact category in the impact of the crisis dimension.

Table 4: Accountability of displacement data in INFORM Severity Index

Model	Displacement figures
Impact of the crisis/Human impact	Outgoing refugees, IDPs
Condition of people affected	Incoming refugees, asylum seekers, returnees, IDPs

6.3.2 International displacement: connect crisis

Although most of the crises included in INFORM Severity Index contain displacement figures, one category of crisis is specifically related to displacement. A crisis is classified "International Displacement" when international displacement involves a number of people crossing international borders, being in need of assistance regardless of their status (**Annex 2**).

It would important to explicitly associate crisis that originate the displacement (country of origin), and the crisis created by the arrival of the displaced (country of destination). This would be possible once the route of international displacement (network of the crisis) can be well defined. Several sources could help to define the networks: IOM (migration), UNHCR (refugee), USAid (regional migration crises, especially central and South America).

Table 5: Venezuela refugee's crisis: connection between the crisis that originated the displacement and the crises caused by the ingoing refugees in the hosting countries (INFORM Severity Index, August 2020[21]).

Original crisis	Related countries (CRISIS_network)	Active CRISIS same Type in the same release period	Active CRISIS different Type in the same release period
VEN001	Mexico	MEX001	MEX002, MEX003
	Costa Rica		CRI002
	Panama		
	Colombia	REG002, COL002	COL001
	Ecuador	REG002, ECU002	
	Peru	REG002, PER002	
	Paraguay		
	Argentina		
	Chile		
	Uruguay		
	Brazil	REG002, BRA002	
	Guyana		
	Trinidad and Tobago	REG002, TT002	
	Curacao		
	Dominican Republic		
	Aruba		

Source: Authors

[21] https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Severity/Results-and-data

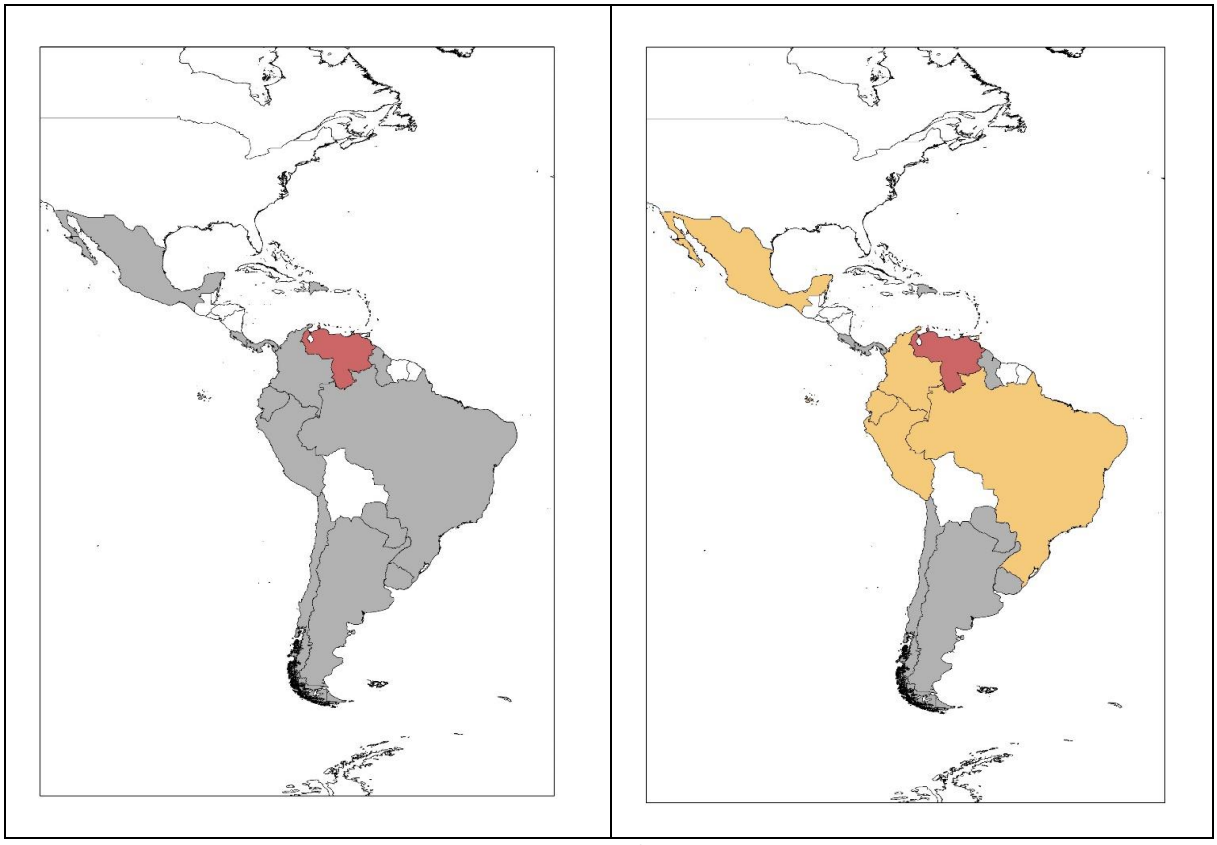
In order to make this visible and accessible in the INFORM Severity Index, it is recommended to:

1. visualize the network of the crisis,
2. visualize which other country in the network has an active related crisis (related by type of crisis),
3. visualize which other country in the network has an active crisis, not necessary related (not same type of crisis but might contain related caseload).

A known example of international displacement crisis is the Venezuela refugees' crisis. Venezuela is experiencing a political and economic crisis that has led to severe shortage of food and medicine and has driven 3.6 million Venezuelans to flee the country. The Venezuela crisis accounts for 16 countries of official destinations of Venezuelan refugees[22].

The INFORM Severity Index (August 2020) includes 6 of the countries in the network, of which 5 are included in the Venezuela regional crisis (**Table 5**, **Figure 20**). In addition, 3 countries in the network experience crisis not related to the Venezuela refugees crisis.

Figure 20. Venezuela crisis network. In grey the countries of destination of the Venezuelan refugees, in Yellow the countries included in the INFORM Severity Index (August 2020).



Source: authors

[22] Regional Refugee and Migrant Response Plan for Refugees and Migrants from Venezuela (RMRP): https://r4v.info/es/documents/download/67282

7 Statistical analysis

Statistical analysis can dissipate some of the controversy surrounding composite indicators. It is frequently argued that composite indicators are too subjective, due to all the assumptions needed to build them, for instance in the choice of weights or of the aggregation system. A combination of correlation and uncertainty analysis can help to gauge the robustness of the composite indicator, and to increase its transparency.

The data utilized are twelve months of crises collected since the launch of the Beta version, with thresholds and aggregation method defined in the revised methodology described in this report.

7.1 Correlation matrix

Correlation analysis reveals bivariate (i.e., pairwise) Pearson's correlation coefficients between the variables, positioned in the same level or different levels of the composite index structure (**Table 6**). A relative lack of correlation among the sub-indices of the same component/category/dimension, that is the indices within the same level, is a useful property. It indicates that they are measuring different 'statistical dimensions' in data. The less they are correlated the more variables are needed to explain the same level of the variance.

All the dimensions and categories are positive correlated with the final score (i.e. INFORM Severity Index), varying from a range of 0.57 (Geographical impact) to 0.93 (Condition of affected people).

Table 6: Correlation matrix

	INFORM Severity Index	Impact of the crisis	Geographical	Human	Conditions of affected people	People in need	Concentration of conditions	Complexity of the crisis	Society and safety	Operating environment
INFORM Severity Index	1.00	**0.79**	0.57	0.77	**0.93**	0.92	0.74	**0.78**	0.62	0.77
Impact of the crisis	0.79	1.00	0.81	0.91	0.60	0.70	0.34	0.54	0.37	0.55
Geographical	0.57	0.81	1.00	0.51	0.43	0.59	0.12	0.33	0.16	0.37
Human	0.77	0.91	0.51	1.00	0.60	0.64	0.42	0.56	0.44	0.55
Conditions of affected people	0.93	0.60	0.43	0.60	1.00	0.94	0.88	0.56	0.44	0.55
People in need	0.92	0.70	0.59	0.64	0.94	1.00	0.66	0.58	0.44	0.58
Concentration of conditions	0.74	0.34	0.12	0.42	0.88	0.66	1.00	0.42	0.36	0.40
Complexity of the crisis	0.78	0.54	0.33	0.56	0.56	0.58	0.42	1.00	0.83	0.95
Society and safety	0.62	0.37	0.16	0.44	0.44	0.44	0.36	0.83	1.00	0.62
Operating environment	0.77	0.55	0.37	0.55	0.55	0.58	0.40	0.95	0.62	1.00

Source: Authors

A square of a Pearson's correlation coefficient between the sub-indices and one-level-up aggregate index (component/category/dimension) can measure the influence of sub-index on the aggregate index due to correlation (Paruolo et al., 2013). The relative differences among those correlations explain the influence of a given sub-index for the aggregate index. In weighted arithmetic or geometric average (including the case of equal weights), nominal weights are defined by the methodology. However the relative influence of indices for the aggregated index depends on their distribution after normalisation as well as their correlation structure. So, it can be the case that the nominal weighting scheme of the composite index does not reflect the statistical

importance of individual indices within the structure. In that case is good practice to adjust the weighting scheme.

The results of the correlation analysis are shown in **Table 7**. Normalised Pearson's correlation coefficients (always squared) of the categories within the same dimension justifies the weighting imposed in the INFORM Severity Index methodology. The highest correlation of the "Condition of affected people" dimension with the INFORM Severity Index is explained by the higher weight assigned to the dimension. In the "Impact of the crisis" dimension, the higher weight assigned to "Human impact" category is needed to compensate the statistical prevalence of the "Geographical impact". So, dimensions and categories of the composite index are well structured and balanced.

Table 7: Statistical influences of the INFORM Severity Index categories within dimensions

	Weights	Impact of the crisis		Conditions of affected people		Complexity of the crisis		INFORM Severity	
		CC^2	Norm	CC^2	Norm	CC^2	Norm	CC^2	Norm
Geographical	30%	0.66	**0.44**						
Human	70%	0.83	**0.56**						
People in need	50%			0.88	**0.53**				
Concentration of conditions	50%			0.77	**0.47**				
Society and safety	50%					0.69	**0.44**		
Operating environment	50%					0.90	**0.56**		
Impact of the crisis	23%							0.62	**0.30**
Conditions of affected people	46%							0.86	**0.41**
Complexity of the crisis	30%							0.61	**0.29**

CC — Pearson's correlation coefficient

Norm — Normalised influence

Source: Authors

7.2 Uncertainty Analysis

To explore the effects of methodological choices (weighting and aggregation) at the dimension level of the model, we follow the approach introduced by Marzi (Marzi et al., 2019). To control the trade-offs during the aggregation process, we apply the ordered weighted average (OWA) operator (Yager, 1988) which provides a circumstance in which the degree of compensation can be adjusted and modified (Yager, 1988). The "compensation" degree denotes trade-offs between higher performance in some indicators (dimensions in our case) and lower performance in other ones. Using additive aggregators with high degree of compensation implies that underperformance with respect to one or more indicators may not receive the adequate attention (Marzi, Mysiak and Santato, 2018).

The OWA operator is defined in Equation 2:

$$OWA(x_1, \dots, x_n) = \sum_{i=1}^{n} w_i . x_{\sigma(i)} \qquad \text{Equation 2}$$

where σ is a permutation ordering the elements as $x_{\sigma(1)} \leq \cdots \leq x_{\sigma(n)}$, with associated non-negative weights in the range of [0,1] summing up to one ($\sum_{i=1}^{n} w_i = 1$) (Yager, 1988; Zabeo, 2011; Jin, Kalina and Qian, 2017). The OWA operator provides a family of operators, including a maximum (1,0, 0,...,0), minimum (0,0,...,1), k-order statistics (kth weight equal to 1 and the rest zero), the arithmetic mean ($\frac{1}{n}, \frac{1}{n}..., \frac{1}{n}$) and a window type OWA, which takes the average of *m* components in the centre (Fullér, 1996; Zabeo, 2011). The weights can be ordered in different ways and distributed by using either linear or uniform patterns (Jin, Kalina and Qian, 2017; Mysiak *et*

al., 2018). In order to evaluate how different weights distributions can affect OWA, different combinations of weights have been simulated following a linear distribution. To populate the weight configurations, we followed a quasi-Monte Carlo approach. The number of Monte Carlo simulation can be computed using $N = 2B(k + 1)$ where *N* is the number of runs in the Monte Carlo simulation, *B* stands for base sample size (in our case 1200), and *k* is the number of input parameters (3 parameters in our case). Using the equation, 9600 runs are required to produce reliable sensitivity measures. We simulated 10,011 OWA weight configuration ordered by ORNESS measure.

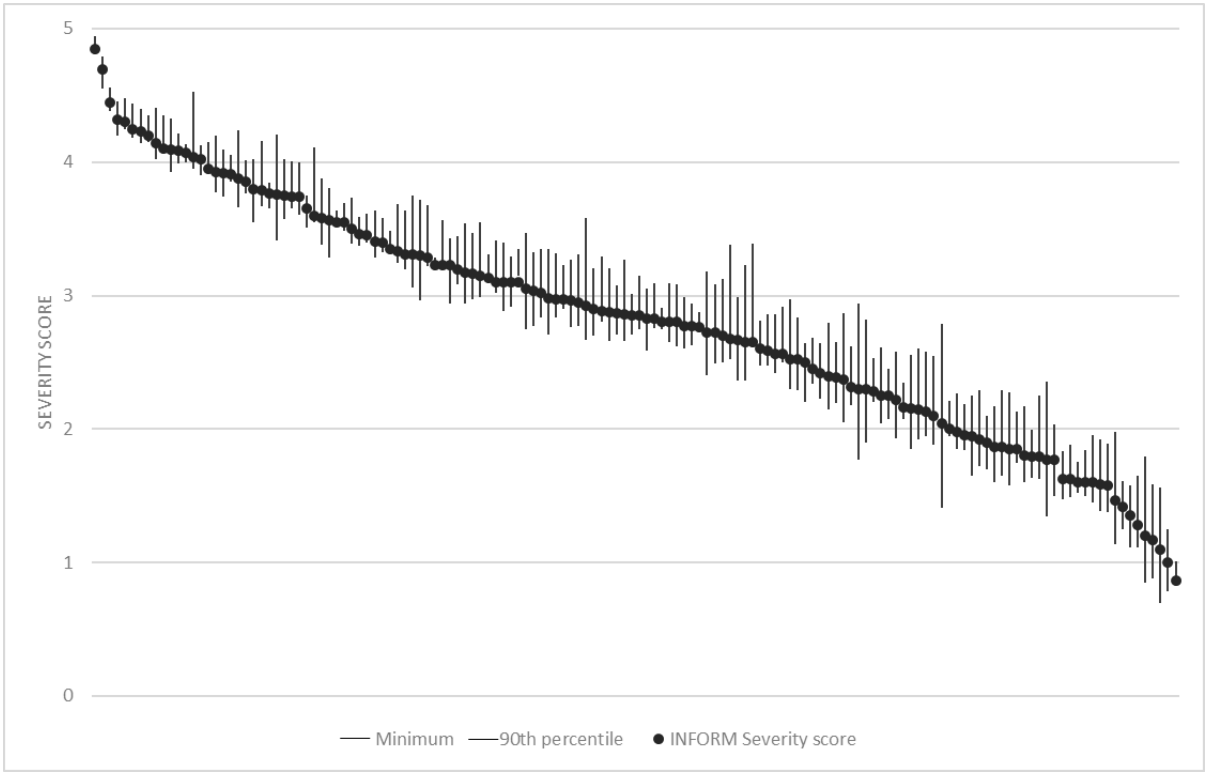
In order to examine the trade-offs, Yager (Yager, 1988) introduced the degree of ORNESS determining the proximity to the maximum operator for a particular set of weights (Zabeo, 2011; Chaji, Fukuyama and Khanjani Shiraz, 2018). The ORNESS index is given by Equation 3:

$$ORNESS(w_1, \dots, w_n) = \frac{1}{n-1} \sum_{i=1}^{n} w_i.(n-i) \qquad \text{Equation 3}$$

The ORNESS index evaluates the extent to which the indicators compensate each other. ORNESS equal to unity shows the highest proximity to a maximum operator indicating full compensative trade-offs (optimistic approach). Contrarily, ORNESS equal to zero indicates the highest propensity to a minimum operator reflecting perfect complementary behaviour (pessimistic approach). The special case of ORNESS equal to 0.5 determines the highest proximity to an arithmetic mean operator (additive approach) (Pinar *et al.*, 2014).

The ANDNESS index is a complement of the ORNESS ($ANDNESS + ORNESS = 1$), measuring the level of complementarity among the indicators (Dujmović and Cordeliers, 2006; Belles-Sampera *et al.*, 2014; Pinar *et al.*, 2014). The OWA operator controls the level of compensation by using a different order of weights. The order of weights corresponding to higher ORNESS levels indicates a higher degree of compensation and proximity to a maximum operator and vice versa. Since we are dealing with severity, employing non-compensatory approaches are more plausible. Hence, we only consider the ANDNESS in the range of 0.5 to 1.

Figure 21. OWA simulations: Impact on the severity score of various combinations of OWA weights ordered by ANDNESS levels



Source: Authors

Moving toward low compensability (higher ANDNESS), the results will tend towards the minimum (higher severity) while moving toward high compensability (lower ANDNESS), the results will tend toward the average. In the case of high severity countries, underperformance among the indicators leads to higher severity scores while exposed to higher ANDNESS levels. Contrarily, the under-performance will be relaxed while shifting toward the average, and yields lower severity scores. The results depend also on the theoretical framework, and the data used, but are independent of the methodology, given that they present a whole set of alternative scenarios. The dominant source of the deviations arises from the degree of compensation among the indicators. Hence, the trade-offs should be made explicit for choosing aggregators that reflect the intended degree of compensation.

The analysis results are shown in **Figure 21**. The error bars indicate the uncertainty levels associated with the crisis scores in the INFORM Severity Index. The higher the uncertainty, the greater caution should be taken on any conclusions. Accordingly, it can be observed that in the crises with higher severity scores the uncertainty range is very low. In the contrary, for the crises with medium severity scores, the uncertainty is larger.

In order to understand better the level of confidence of the INFORM Severity Index results, we calculated for each crisis the percentage of the OWA simulations results that fall in the 5 severity categories. We then calculated the percentage of the match with the INFORM Severity Index categories (i.e. for each crisis, the percentage of the OWA simulations that match the same category of the INFORM Severity Index).

The **Table 8** shows that as overall, there are 83% of correct matching, proving that the index is robust and not being strongly influence by the final aggregation and weighting choice. This is even more valid for the crises in very high severity (99% of match), and high severity (85% of match).

Table 8: Degree of matching between INFORM Severity Index and OWA simulations by the 5 severity categories

	Very Low	Low	Medium	High	Very High	Total
% of MATCH	86%	82%	77%	85%	99%	83%

Source: Authors

8 Using INFORM Severity Index

8.1 Interpretation of the INFORM Severity index results

All results are provided on a scale of 0-5, where 5 represents the highest severity. Darker colours represent higher values and higher severity.

The INFORM Severity Index is presented as

- a real value 0-5 and
- 5-level categorisation (**Table 9**).

The category is calculated by rounding up the value (e.g. 3.1 = 4, 3.9 = 4).

Table 9: INFORM Severity Index categorisation

Numerical level	Descriptive level
5	very high
4	high
3	medium
2	low
1	very low

Source: Authors

The categorisation of a crisis as low or medium severity does not mean there are no people that require humanitarian assistance. Simply that there are fewer than in a high or very high severity crisis. The Index is not designed to direct resources to only high and very high severity crises. It is intended to ensure that all crises receive attention that is proportional with their severity.

The INFORM Severity Index can be used to monitor trends. Each month, a 6-month trend is calculated from main results with 3-month moving average. The comparison of the latest value with the value of 3 months before eventually shows whether the INFORM Severity Index value has increased, remained stable, or decreased. A trend is considered significant (i.e. increasing or decreasing) if there is at least 0.1 difference between the values.

However, trends must be interpreted with caution, since changes in the Index have different groups of possible drivers (Chapter 6.1).

8.2 Understanding of the INFORM Severity index release

The following recommendations for the interpretation of the INFORM Severity Index are meant to provide users with an unambiguous set of answers on the nature and use of the index:

- The INFORM Severity Index is a measure of humanitarian outcomes derived from the impact of an event, either natural, man-made or a combination of both, occurred in an environment that presents a complex situation to deliver assistance to individuals
- The INFORM Severity Index is obtained from the application of a ROUNDUP calculation to the severity value – also reported in the monthly release of the INFORM Severity. The ROUNDUP operation applies to every severity value and has been found as the most appropriate and understandable way to distribute multiple values into the five classes of the severity score
- The INFORM Severity Index provides an estimate of the severity of a humanitarian crisis at a defined time. The underlying data contributing to the severity score are all from public sources – in order to

ensure transparency and replicability of the process – hence they are provided according to different methodologies and different time frames

- The INFORM Severity Index associated with a release of the INFORM Severity represents a combination of the most updated information available that passed the minimum requirements and expert knowledge at data entry level. It is expected that in data-challenging environments, such as crisis with low reporting capacity from humanitarian organizations, or sudden onset emergencies, data may not accurately reflect the current humanitarian situation
- The INFORM Severity Index provides comparability between crises and within the same crisis over time, but not a ranking of humanitarian needs
- The INFORM Severity Index provides a context analysis for the humanitarian needs (within the "Conditions of people affected" dimension) in the form of information contained in the dimensions of "Impact of the crisis" and "Complexity of the crises"
- In using the INFORM Severity Index to compare crises, or to analyse a crisis over time, the user needs to consider the underlying data utilized and their variability: in order to isolate and visualize changes in the score due to changes in data sources the INFORM Severity Index includes a tracking of the changes in sources, yet the users are required to be aware that an in-depth understanding of the underlying data is important when making comparison

8.3 Limitations

Humanitarian crises are by definition extremely complex and therefore any attempt to model them is a simplification of reality. Limitations come from the methodology for aggregating the data and from the source data itself.

8.3.1 Methodological limitations

Precision: Results presented with a high level of precision could be perceived to be more accurate than they are. Therefore, the INFORM Severity Index results in a categorisation of crises - all crises fall into one of five categories. The Index value can provide further information about trends in a specific crisis and help interpretation of the results. Be cautious interpreting values close to a category boundary (e.g. 2.9 vs. 3.1).

Crises affect people differently: In any crisis there will be a range of conditions experienced by the affected people. Some individuals will be severely affected and require assistance, even in a crisis that is not assessed as highly severe overall. The Index therefore attempts to provide information about the distribution of severity within a crisis. All crises involve people that require assistance.

Double counting of displaced people: Incoming refugees are included in the condition of people affected dimension, outgoing refugees are included into human category in the impact of the crisis dimension. Displaced people relates to two crisis, one at the source and the other at the destination. The latter crisis is usually related to international displacement type of the crisis, where displaced people are the one in need.

8.3.2 Data limitations

Data quality and judgement: The INFORM Severity Index essentially aggregates information from a range of sources to allow measurement of severity on a common scale. Each crisis has different types and quality of data available. Judgements must be made in what data to use and the comparability of indicators between crises. This may result in unintended bias or errors. The INFORM Severity Index results or source data should not be considered to be more accurate or to replace individual indicators for specific crises. Users are advised to consult the original sources for the most up-to-date data.

Reliance on primary data: The INFORM Severity Index is wholly reliant on primary data generated in crises through various methods. It is not a mechanism for collecting or generating primary data and cannot improve it. Therefore the INFORM Severity Index is only as good as - and certainly not a replacement for – this primary data, which must continue to be improved in terms of quality and standardisation.

Data availability: Some indicators identified by the expert group as relevant for the assessing of the severity of humanitarian crises. Indicators such as illnesses, injured, physical damages, economic losses are currently not included in the model due to the lack of data coverage.

8.4 SWOT of the INFORM Severity Index

Table 10: SWOT of the INFORM Severity Index

STRENGTHS	WEAKNESSES
• The beta version has been tested with a baseline, proving that the INFORM Severity Index has been able to capture the overall number of humanitarian crises, a good match by geographic area and type of crisis and has the capacity to provide an estimate of the severity not too distant from the equivalent measure derived from indicators of outcomes and needs elaborated by other international organizations. • Open source with a transparent methodology and full access to data, algorithm and results to ensure maximum transparency, replicability and interoperability. • Data-driven results from the moment of the data entry to the generation of the INFORM Severity Index, strengthen the transparency of the system • The concept of Severity applied to humanitarian crises is getting widely adopted by the humanitarian community, as much as the urgency to have available a tool to go beyond the measure of humanitarian needs, with more contextual information and comparability	• The underlying data determine the capacity of the index to capture and reflect the severity of the humanitarian crisis, hence the quality of the data, their timeframe and data collection method has an influence in the reliability of the calculation of the INFORM Severity Index. • Disclaimers and reference to the methodology in the release are needed to reduce, and possibly avoid, the misuse or misinterpretation of information: for example trend analysis needs an accurate consideration of how the underlying data utilized can contribute to observed variability due to changes in data sources and methodology for information collection, rather than an actual change in the humanitarian crisis.
OPPORTUNITIES	**THREATS**
• Modularity to include organizations' own estimates of response capacity • Regional and sub-national model for Severity can provide an added value in the understanding of complex crises • Expand the theoretical framework of the INFORM Severity Index • Include more analytical information with the release of the INFORM Severity Index to support users with data interpretation	• Disruption in data sources can affect the capacity to generate a reliable INFORM Severity Index • High volume of data can bring the system currently utilized to face a technological barrier in terms of capacity to operate efficiently to generate a INFORM Severity Index

Source: Authors

9 Conclusion and way forward

Joint Research Centre of the European Commission reconsidered the concept, theoretical framework, assumptions and calculation of the INFORM Severity Index, developed sound methodology and prepared the transparent guidelines for its implementation.

With the publication of this report, the Joint Research Centre (JRC) of the European Commission is responsible for the INFORM Severity Index methodology. JRC will provide technical and scientific support for official release of INFORM Severity Index in October 2020 jointly with ACAPS, INFORM partner responsible for the data collection process of INFORM Severity Index and the implementation of methodology, and UNOCHA, the coordinator of INFORM partnership. This will end the period of the releases of beta version of the INFORM Severity Index.

The INFORM Severity Index monthly releases will be published on INFORM central hub hosted by European Commission (https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Severity).

This report is considered to be the first version of the methodology as it is expected to be upgraded with the experiences gained through further usage and confronting new situations, feedbacks from the partners and the availability of better data.

The concept of the INFORM Severity Index is based on three dimensions: impact of the crisis, conditions of people affected and complexity of the crisis. The model of INFORM Severity index is divided into levels to give insight into each of the dimensions to provide a quick overview of the underlying factors defining the severity of a humanitarian crisis.

The advantage of the INFORM Severity Index is that it allows measurement of severity on a common 5-level scale and an improved and widely shared understanding of crisis severity. INFORM Severity Index provides evidences that can contribute to better decisions in response that lead to better outcomes for affected people. Furthermore, INFORM Severity Index keeps up with strong commitment of EC and the priority of Sendai Framework to reinforce evidence base decision making.

The INFORM Severity Index should not be used alone. The INFORM Severity Index is only one source of information that can support decisions about humanitarian crises. It would typically be complemented by other sources, such as crisis-specific information like coordinated or agency/sector-specific assessments and appeals. It can also be complemented by risk, early warning and capacity information.

INFORM Severity index complements INFORM Risk Index in the INFORM Suite. INFORM initiative will focus now on development of the INFORM Warning tool to provide information in systematic way on any indication of elevated risk, emerging crisis and crisis triggers needed for preparedness, early warning and early action phase.

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Annex 1. Fact sheet of core indicators

Table 11: List of core indicators of INFORM Severity Index

No.	Name of core indicator	Position in the INFORM Severity model		
1	Affected area (absolute)	Area affected	Geographical	Impact of the crisis
2	Affected area (relative to the total area of the country)			
3	People in the affected area (absolute)	People in the affected area		
4	People in the affected area (relative to the total population of the country)			
5	People affected (absolute)	People affected	Human	
6	People affected (relative to the people in the affected area)			
7	Displaced (absolute)	People affected by category		
8	Displaced (relative to affected people)			
9	Fatalities (absolute)			
10	Fatalities (relative to affected people)			
11	People in extreme conditions -Level 5 (absolute)	Cumulative distribution	People in need	Conditions of people affected
12	People in severe conditions -Level 4 (absolute)			
13	People in moderate conditions -Level 3 (absolute)			
14	People in stressed conditions -Level 2 (absolute)			
15	People in none/minimal conditions -Level 1 (absolute)			
16	People in extreme conditions -Level 5 (relative to population in the affected area)	Relative cumulative distribution	Concentration of conditions	
17	People in severe conditions -Level 4 (relative to population in the affected area)			
18	People in moderate conditions -Level 3 (relative to population in the affected area)			
19	People in stressed conditions -Level 2 (relative to population in the affected area)			
20	People in none/minimal conditions -Level 1 relative to population in the affected area)			
21	Empowerment	Social cohesion	Society and safety	Complexity of the crisis
22	BTI – Democracy status			
23	Ethnic fractionalization			
24	Size of excluded ethnic groups			
25	Gender inequality			
26	GINI coefficient			
27	Conflict intensity	Safety and security		
28	Fatalities in all crises			
29	Corruption perception	Rule of law		
30	Rule of law (WGI)			
31	Rule of law (BTI)			
32	Freedom in the world			
33	Humanitarian profile	Diversity of groups affected	Operating environment	
34	Impediments to entry into country	Humanitarian access		
35	Restriction of movement			
36	Interference into implementation of humanitarian activities			
37	Violence against personnel, facilities and assets			
38	Denial of existence of humanitarian needs or entitlements to assistance			
39	Restriction and obstruction of access to services and assistance			
40	Ongoing insecurity/hostilities affecting humanitarian assistance			
41	Presence of mines and improvised explosive devices			
42	Physical constraints in the environment			

Source: Authors

Core indicators of impact of the crisis dimension

Component	Area affected – absolute
Indicator	Total # of square kilometres affected by the crisis
Description	Total # of square kilometres affected by the crisis
Source	Multiple sources are used: • World Bank: https://databank.worldbank.org • Humanitarian Data Exchange: https://data.humdata.org/ • National statistics agencies • …
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: 10^3 , MAX: 10^6

Component	Area affected - relative
Indicator	% of square kilometres affected by the crisis on the total area of the country
Description	% of square kilometres affected by the crisis on the total area of the country
Source	• Humanitarian Data Exchange: https://data.humdata.org/ • IPC/Cadre Harmonise (especially for droughts, food crises and crop failure) • UNOCHA HNO • National statics agencies • …
Data processing	MIN-MAX normalisation using the following parameters: MIN: 2% , MAX: 100%

Component	People living in the affected area - absolute
Indicator	Total # of people living in the affected area
Description	Total # of people living in the affected area
Source	• Humanitarian Data Exchange: https://data.humdata.org/ • IPC/Cadre Harmonise (especially for droughts, food crises and crop failure) • UNOCHA HNO • National statics agencies • …
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: 10^6 , MAX: $10^{7.5}$

Component	People living in the affected area - relative
Indicator	% of people living in the affected area on the total population of the country
Description	% of people living in the affected area on the total population of the country
Source	• Humanitarian Data Exchange: https://data.humdata.org/ • IPC/Cadre Harmonise (especially for droughts, food crises and crop failure) • UNOCHA HNO • National statics agencies • …
Data processing	MIN-MAX normalisation using the following parameters: MIN: 1% , MAX: 100%

Component	People affected - absolute
Indicator	Total # of people affected by the crisis
Description	Total # of people affected by the crisis
Source	• Humanitarian Data Exchange: https://data.humdata.org/ • IPC/Cadre Harmonise (especially for droughts, food crises and crop failure) • UNOCHA HNO • National statics agencies
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: $10^{4.5}$, MAX: $10^{7.5}$

Component	People affected - relative
Indicator	% of total population affected on the total population living in the affected area
Description	% of total population affected on the total population living in the affected area
Source	• Humanitarian Data Exchange: https://data.humdata.org/ • IPC/Cadre Harmonise (especially for droughts, food crises and crop failure) • UNOCHA HNO • National statics agencies
Data processing	MIN-MAX normalisation using the following parameters: MIN: 1% , MAX: 100%

Component	People displaced - absolute
Indicator	Total # of crisis related displaced people
Description	Total # of displaced people generated by the crisis. These include outgoing refugees, IDPs.
Source	• UNHCR: https://data2.unhcr.org • IOM DTM • UNRWA: https://www.unrwa.org • National statistics
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: 10^3 , MAX: $10^{6.5}$

Component	People displaced - relative
Indicator	% of total population displaced on the total population affected
Description	% of displaced people generated by the crisis on the total population affected
Source	• UNHCR: https://data2.unhcr.org • IOM DTM • UNRWA: https://www.unrwa.org • National statistics
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0% , MAX: 15%

Component	Fatalities - absolute
Indicator	Total # of crisis related fatalities
Description	Total # of crisis related fatalities in the last 6 months
Source	A primary source for this indicator is the ACLED dataset (https://www.acleddata.com/data) If the ACLED dataset is not available, the following sources are utilized: • IOM Missing Migrants Project: https://missingmigrants.iom.int • Deep South Watch: https://deepsouthwatch.org • Flash situation reports published by UNOCHA • National statistics
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: 1 , MAX: $10^{3.5}$

Component	Fatalities - relative
Indicator	% of fatalities on the total population affected
Description	% of crisis related fatalities in the last 6 months on the total population affected
Source	A primary source for this indicator is the ACLED dataset (https://www.acleddata.com/data) If the ACLED dataset is not available, the following sources are utilized: • IOM Missing Migrants Project: https://missingmigrants.iom.int • Deep South Watch: https://deepsouthwatch.org • Flash situation reports published by UNOCHA • National statistics
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0% , MAX: 0.01%

Core indicators of conditions of affected people dimension

Component	People in need
Indicator	People in need (level 3-5)
Description	Total # of people with identified humanitarian needs included in Level 3–5
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Logarithmic transformation MIN-MAX normalisation using the following parameters: MIN: 10^4 , MAX: 10^7

Component	Concentration of conditions
Indicator	% of people facing none/minimal humanitarian conditions related to the total population of the affected area (level 1)
Description	People are facing none or minor shortages or/and accessibility problems regarding basic services, such as food, health, shelter, and WASH. People are able to meet basic needs without having to apply to irreversible coping strategies
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%

Component	Concentration of conditions
Indicator	% of people facing stressed humanitarian conditions related to the total population of the affected area (level 2)
Description	People are facing some shortages or/and some availability and accessibility problems in regard to basic services but they are not life-threatening. Needs are more increased but are still not life-threatening. The affected population can meet their need by applying copying strategies. There may exist localized/targeted incidents of violence and/or human rights violations
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%

Component	Concentration of conditions
Indicator	% of people facing moderate humanitarian conditions and needs related to the total population of the affected area (level 3)
Description	People are facing shortages and/or availability and accessibility problems in regard to basic services that cause discomfort and/ or high level of suffering which can result in irreversible damages to the health status, but they are not life-threatening. Significant gaps are visible or people are marginally able to meet minimum needs only with irreversible coping strategies. As a result of shortages and disruption of services, may face potentially life-threatening consequences if not provided assistance. People may also face malnutrition. There may be physical and mental harm in populations resulting in a loss of dignity
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%

Component	Concentration of conditions
Indicator	% of people facing severe humanitarian conditions and needs related to the total population of the affected area (level 4)
Description	People are facing life-threatening conditions and significant shortages and/or availability and accessibility problems in regard to basic services causing high level of suffering and irreversible damages to health status. People may face severe food consumption gaps and have started to deplete their assets or already face an extreme loss of assets. This may result in very high levels of acute malnutrition and excess mortality. Presence of irreversible harm and heightened mortality as well as widespread grave violations of human rights
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%

Component	Concentration of conditions
Indicator	% of people facing extreme humanitarian conditions and needs related to the total population of the affected area (level 5)
Description	People are facing extreme shortages or availability and accessibility problems in regard to basic services. Deaths are directly caused by the current conditions and there is widespread mortality. People face a complete lack of food and/or other basic needs and starvation, death, and destitution are evident. Acute malnutrition may be widely reported. They may face grave human rights violations
Source	• Humanitarian Response: https://www.humanitarianresponse.info • Humanitarian Data Centre: https://data.humdata.org • IPC: http://www.ipcinfo.org; Cadre Harmonise • Humanitarian Needs Overview • UNHCR: http://data.unhcr.org
Data processing	Relative values (i.e., cumulative relative frequency expresses in % of people in affected area) and equals to the level with cumulative relative frequency just greater than 5%

Core indicators of complexity of the crisis dimension

Component	Rule of Law
Indicator	Corruption perception index
Description	The CPI scores and ranks countries/territories based on how corrupt a country's public sector is perceived to be. It is a composite index, a combination of surveys and assessments of corruption
Source	Transparency International: http://www.transparency.org/research/cpi/
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 100
Unit of measure	Non dimensional number ranging 0 to 100

Component	Rule of Law
Indicator	Rule of law (WGI)
Description	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Source	Worldwide Governance Indicators World Bank: http://info.worldbank.org/governance/wgi/index.aspx
Data processing	MIN-MAX normalisation using the following parameters: MIN: -2.5 , MAX: 2.5
Unit of measure	Non dimensional number ranging -2.5 to 2.5

Component	Rule of Law
Indicator	Rule of law (BTI)
Description	The Bertelsmann Stiftung's Transformation Index (BTI) analyzes and evaluates the quality of democracy, a market economy and political management in 129 developing and transition countries. It measures successes and setbacks on the path toward a democracy based on the rule of law and a socially responsible market economy. It also entails an evaluation of the rule of law including the separation of powers and the prosecution of office abuse. BTI focuses on transformation towards democracy under the rule of law and a market economy anchored in principles of social justice in its analysis, it excludes countries that might be considered long-consolidated democratic systems and in which economic development can be regarded as well-advanced
Source	Bertelsmann Stiftung's Transformation Index (BTI): https://www.bti-project.org/en/index/
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 10
Unit of measure	Non dimensional number ranging 0 to 10

Component	Rule of Law
Indicator	Freedom in the World
Description	Freedom in the World is Freedom House's flagship annual report, assessing the condition of political rights and civil liberties around the world. It is composed of numerical ratings and supporting descriptive texts for 195 countries.
Source	Freedom house: www.freedomhouse.org
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 100
Unit of measure	Non dimensional number ranging 0 to 100

Component	Safety and security
Indicator	Conflict intensity
Description	The HIIK's annual publication Conflict Barometer describes the recent trends in global conflict developments, escalations, de-escalations, and settlements.
Source	Conflict Barometer: https://www.hiik.de/en/konfliktbarometer/
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 5
Unit of measure	Non dimensional number ranging 1 to 5

Component	Safety and security
Indicator	People killed in all crises
Description	Total people killed by conflict in the country hosts the crisis
Source	A primary source for this indicator is the ACLED dataset (https://www.acleddata.com/data) If the ACLED dataset is not available, the following sources are utilized: • IOM Missing Migrants Project: https://missingmigrants.iom.int • Deep South Watch: https://deepsouthwatch.org • Flash situation reports published by UNOCHA • National statistics
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 5
Unit of measure	Non dimensional number ranging 1 to 5

Component	Inequality
Indicator	Gender inequality
Description	The Gender Inequality Index (GII) reflects gender-based disadvantages in three dimensions—reproductive health, empowerment and the labour market. The value of GII range between 0 to 1, with 0 being 0% inequality, indicating women fare equally in comparison to men and 1 being 100% inequality, indicating women fare poorly in comparison to men.
Source	UNDP: http://hdr.undp.org/en/content/gender-inequality-index-gii
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 0.8
Unit of measure	Non dimensional number ranging 0 to 1

Component	Inequality
Indicator	Income Gini coefficient
Description	Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.
Source	World Bank: https://data.worldbank.org/indicator/SI.POV.GINI
Data processing	MIN-MAX normalisation using the following parameters: MIN: 25 , MAX: 65
Unit of measure	Non dimensional number ranging 0 to 100

Component	Ethnic fractionalization
Indicator	Ethnic fractionalization
Description	Ethnic fractionalization Index is calculated using a simple Herfindahl concentration index from Ethnic Power Relations (EPR) Dataset.
Source	ETHZurich GREG
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 1
Unit of measure	Non dimensional number ranging 0 to 1

Component	Ethnic fractionalization
Indicator	Size of excluded ethnic groups
Description	The Minorities at Risk (MAR) project monitors and analyzes the status and conflicts of politically-active communal groups in all countries. The focus of the MAR project has been "minorities at risk.
Source	The Minorities at Risk (MAR) project, Center for International Development and Conflict Management (CIDCM): http://www.mar.umd.edu/mar_data.asp
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 0.5
Unit of measure	Non dimensional number ranging 0 to 1

Component	Trust in society
Indicator	Empowerment
Description	This is an additive index constructed from the Foreign Movement, Domestic Movement, Freedom of Speech, Freedom of Assembly & Association, Workers' Rights, Electoral Self-Determination, and Freedom of Religion indicators. It ranges from 0 (no government respect for these seven rights) to 14 (full government respect for these seven rights).
Source	CIRI Human Rights Dataset: http://www.humanrightsdata.com/p/data-documentation.html
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 14
Unit of measure	Non dimensional number ranging 0 to 14

Component	Trust in society
Indicator	BTI - Democracy status
Description	The Bertelsmann Stiftung's Transformation Index (BTI) analyzes and evaluates the quality of democracy, a market economy and political management in 129 developing and transition countries. It measures successes and setbacks on the path toward a democracy based on the rule of law and a socially responsible market economy. It also entails an evaluation of the rule of law including the separation of powers and the prosecution of office abuse.
Source	Bertelsmann Stiftung's Transformation Index (BTI): https://www.bti-project.org/en/index/
Data processing	MIN-MAX normalisation using the following parameters: MIN: 0 , MAX: 10
Unit of measure	Non dimensional number ranging 0 to 10

Component	Diversity of groups affected
Indicator	# of different types of affected population groups
Description	Number of different types of affected population groups, based on categories of the IASC Humanitarian profile COD 2012. The final value represents a count of types of affected group
Source	Various sources, including: UNOCHA HNO, FEWSNET for crisis involving food security sector, UNHCR for crises involving refugee response
Data processing	Non dimensional number ranging 1 to 5
Unit of measure	Non dimensional number ranging 1 to 5

Component	Humanitarian access
Indicator	Impediments to entry into country (bureaucratic and administrative)
Description	This indicator refers to the general access of international actors into the country. It refers to registration, accreditation and visa policies, provision of taxes or fees on activities or goods; policies related to import and logistics; visa or accreditation delays or denial; discretional registration or visas by authorities, and presence of humanitarian organisations and workers in the country being allowed to operate.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Restriction of movement (impediments to freedom of movement and/or administrative restrictions)
Description	This indicator refers to the in-country mobility of humanitarian workers in order to reach the affected population and transport relief items. It includes presence of taxes and fines on passage of goods and people, quotas and limits on relief items in specific areas, assistance seized, agencies on hold despite being ready to intervene, checkpoints, or closure of border crossings.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Interference into implementation of humanitarian activities
Description	This indicator refers to factors such as conditions imposed on the type of aid, or the modality of aid delivery. It includes operational restrictions imposed by government as well as confiscation or diversion of aid.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Violence against personnel, facilities and assets
Description	This indicator takes into account security incidents involving humanitarian organisations. Incidents include attacks, abduction, execution, kidnapping of workers, and looting of humanitarian warehouses or humanitarian assets.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Denial of existence of humanitarian needs or entitlements to assistance
Description	This indicator takes into account statements that demonstrate a recognition or denial of needs of a population or the rights of minorities, and any discrepancy between the reported humanitarian needs and official statements.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Restriction and obstruction of access to services and assistance
Description	This indicator refers to the affected population's perspective. It assesses whether people are prevented from reaching aid or services – through various restrictions, such as prevention of the crossing of borders to seek refuge, administrative barriers, or requirements to have specific documents. Sieges, roadblocks, curfews, and harassment are be considered.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Ongoing insecurity/hostilities affecting humanitarian assistance
Description	This indicator takes into account the presence of ongoing hostilities or violence that affects humanitarian operations, leading to decisions to divert or suspend aid, or to evacuate or modify operations.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Presence of mines and improvised explosive devices
Description	This indicator looks into how the presence of landmines or Unexploded Ordnance (UXOs) might hinder humanitarian access.
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Component	Humanitarian access
Indicator	Physical constraints in the environment (obstacles related to terrain, climate, lack of infrastructure, etc.)
Description	This indicator looks into seasonal events or weather conditions as well as pre-existing infrastructure. Status of roads, bridges, and airfields are also considered, along with communications and logistical constraints such as lack of fuel or assets hampering physical accessibility to people in need
Source	ACAPS Humanitarian Access Report: https://www.acaps.org
Data processing	Non dimensional number ranging 0 to 3
Unit of measure	Non dimensional number ranging 0 to 3

Annex 2. Types of crisis

The following types of crisis are used in the INFORM Severity Index model:

Cold Wave: Cold Wave is defined as a period of abnormally cold weather. Typically a cold wave lasts two or more days and may be aggravated by high winds. The exact temperature criteria for what constitutes a cold wave vary by location **(CRED EM-DAT)**. It can cause respiratory problems, adverse effects on livelihoods and food security (**ACAPS 2014**).

Complex crisis: A crisis in which natural and/or man-made factors interact and overlap making it often impossible to isolate their impact.

Conflict: A social factual situation in which at least two parties (individuals, groups, states) are involved, and who: i) strive for goals which are incompatible to begin with or strive for the same goal, which, can only be reached by one party; and/or ii) want to employ incompatible means to achieve a certain goal." (Wasmuth, 1996:180- 181). (FEWER) On a national level, conflict may involves warlike encounters between armed groups from the same country which take place within the borders. **(IFRC)**

Drought: Drought is defined as an extended period of unusually low precipitation that produces a shortage of water for people, animals and plants. Drought is different from most other hazards in that it develops slowly, sometimes even over years, and its onset is generally difficult to detect. Drought is not solely a physical phenomenon because its impacts can be exacerbated by human activities and water supply demands. Drought is therefore often defined both conceptually and operationally. Operational definitions of drought, meaning the degree of precipitation reduction that constitutes a drought, vary by locality, climate and environmental sector. **(CRED EM-DAT)**

Earthquake: Earthquake is defined as sudden movement of a block of the Earth's crust along a geological fault and associated ground shaking. **(CRED EM-DAT)** Earthquakes often trigger landslides, tidal waves and tsunamis. Powerful aftershocks frequently occur, causing further damage and increasing psychological stress (**IFRC**).

Epidemic: Epidemic is defined as either an unusual increase in the number of cases of an infectious disease, which already exists in the region or population concerned; or the appearance of an infection previously absent from a region. **(CRED EM-DAT)**

Flood: Flood is a general term for the overflow of water from a stream channel onto normally dry land in the floodplain (riverine flooding), higher-than- normal levels along the coast and in lakes or reservoirs (coastal flooding) as well as ponding of water at or near the point where the rain fell (flash floods). **(CRED EM-DAT)** Flash Flood is defined as rapid inland floods due to intense rainfall A flash flood describes sudden flooding with short duration. In sloped terrain the water flows rapidly with a high destruction potential. **(CRED EM-DAT)**

Food security: Food-security emergencies are complex disasters with multiple root causes. Severe drought and/or conflict can produce an acute food emergency, whereas chronic food insecurity is often a reflection of poverty, a worsening debt crisis, the economic effects at household level of the HIV/AIDS pandemic or mismanagement or abuse of water resources. In such cases, food can be both unavailable (insufficient production) and inaccessible (distribution problems, beyond consumers' purchasing power). Poor nutrition, brought on by food shortages, reduces people's resistance to disease, and makes outbreaks of preventable diseases likely. Water shortages, which force people to use polluted water, increase the risk of waterborne diseases. Food-security problems may drive populations to other areas, such as the outskirts of towns, in search of better conditions. Large settlements of displaced people can form which again increases the risk of disease outbreak. In terms of people's livestock, lack of grazing and water shortages can decimate herds, putting pressure on families that rely on their existence to provide food and food products. Famine and nutritional emergencies can happen quite suddenly. Safe water and basic sanitation are a key concern, as wells and other ground water supplies dry up or become polluted. **(IFRC)**

Heat Wave: Heat Wave is defined as a prolonged period of excessively hot and sometimes also humid weather relative to normal climate patterns of a certain region. Heat waves like in Central Europe 2003. **(CRED EM-DAT)**

International Displacement: International displacement involves a number of people crossing international borders, being in need of assistance regardless of their status.

Land Slide: Land Slide is defined as the usually rapid downward movement of a mass of rock, earth, or artificial fill on a slope. Covers all mass movements other than Mudslide (MS) and Avalanche (AV). **(CRED EM-DAT)** Mud slide is defined as a type of landslide, which occurs when the slope is saturated with water. This more destructive flow can pick up rocks, trees, houses and cars. As the debris moves into river and stream beds, bridges can become blocked or even collapse, making a temporary dam that can flood neighbouring areas. (GLIDE) Snow Avalanche is defined as mass of snow and ice falling suddenly down a mountain slope and often taking with it earth, rocks and rubble of every description. **(CRED EM-DAT)**

Technological Disaster: Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Technological disasters are non-natural disastrous occurrences that include: Accident release, occurring during the production, transportation or handling of hazardous chemical substances. Explosions: disasters will only be classified as explosions when the explosions is the actual disaster. If the explosion is the cause of another disaster, the event will be classified as the resulting disaster. Chemical explosion: violent destruction caused by explosion of combustible material, nearly always of chemical origin. Nuclear explosion/Radiation: accidental release of radiation occurring in civil facilities, exceeding the internationally established safety levels. Mine explosion: accidents which occur when natural gas or coal dust reacts with the air. Pollution: degradation of one or more aspects in the environment by noxious industrial, chemical or biological wastes, from debris or man-made products and from mismanagement of natural and environmental resources. Acid rain: a washout of an excessive concentration of acidic compounds in the atmosphere, resulting from chemical pollutants such as sulphur and nitrogen compounds. When deposited these increase the acidity of the soil and water causing agricultural and ecological damage. Chemical pollution: a sudden pollution of water or air near industrial areas, leading to internal body disorders with permanent damage of the skin. Atmosphere pollution: contamination of the atmosphere by large quantities of gases, solids and radiation produced by the burning of natural and artificial fuels, chemicals and other industrial processes and nuclear explosions **(IFRC)**. Technological disasters are only covered on a very exceptional basis, such as oil/toxic spills and gas explosions, when they have a major humanitarian impact in highly vulnerable countries.

Tropical Cyclone: "Hurricane", "cyclone" and "typhoon" (GLIDE hazard code: TC) are different terms for the same weather phenomenon which is accompanied by torrential rain and maximum sustained wind speeds (near centre) exceeding 119 kilometers per hour: In the western North Atlantic, central and eastern North Pacific, Caribbean Sea and Gulf of Mexico, such a weather phenomenon is called "hurricanes"; In the western North Pacific, it is called "typhoons"; In the Bay of Bengal and Arabian Sea, it is called "cyclones"; In western South Pacific and southeast India Ocean, it is called “severe tropical cyclones”; In the southwest India Ocean, it is called “tropical cyclones.” (WMO)

Tsunami: Tsunami is defined as a series of waves (with long wavelengths when traveling across the deep ocean) that are generated by a displacement of massive amounts of water through underwater earthquakes, volcanic eruptions or landslides. Tsunami waves travel at very high speed across the ocean but as they begin to reach shallow water they slow down and the wave grows steeper. **(CRED EM-DAT)**

Volcano: Volcanic eruption with disastrous effects: eruption and emission of gas and ashes, stone falls (pyroclast), flows of lava, etc.

Wild Fire: Wild Fire (GLIDE hazard code: WF) is defined as ny uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brush land or tundra, which consumes the natural fuels and spreads based on environmental conditions (e.g., wind, topography). Wildfires can be triggered by lightning or human actions. **(CRED EM-DAT)**

Political and economic: The political and economic situation of a country may drive humanitarian needs when the conditions manifest in widespread poverty and chronic shortages of food, medicine, and other basic necessities etc.

Other situations of violence: Lower intensity of violence e.g. riots, demonstrations, oppressive regimes with isolated, sporadic acts of violence, mass arrests, enforced disappearances.

Other: All disasters that do not fall into any of the other disaster types.

Annex 3. Beta version testing phase: Concept validation

In January 2019 Beta version of the INFORM Severity Index (known as Global Crisis Severity Index -GCSI) was made available through monthly releases to INFORM working group and general audience via INFORM website. Main goal was to gather comments, remarks and provide a base of data for further analysis. Since the original design, the INFORM Severity Index model was based on the conceptualization of how indicators should behave, including what thresholds and weights apply, the availability of monthly data has been used to test a set of questions:

1. **Is the INFORM Severity Index able to capture the overall global figure of humanitarian crisis?**
2. **How the INFORM Severity Index captures the spatial distribution of humanitarian crisis by country?**
3. **How the INFORM Severity Index captures the type of crisis?**
4. **How the severity index helps to reduce the variability around its concept and evaluation by multiple organizations?**

In answering the questions, we faced the **challenge of identifying a reliable baseline** to compare the INFORM Severity Index data. At the time of the test, six months of beta releases of INFORM Severity Index were available (January–June 2019), Since the INFORM Severity Index is the first indicator of its nature, there is not a single public comparable data source that provides a scoring of the severity of humanitarian crisis on a global scale. Still, several organizations developed their own in-house tool to score crisis outcomes, often weighting data from field offices by expert judgement to standardize the analytical process across different type of crisis.

In order to build a baseline to compare the INFORM Severity Index results, partner organizations were invited through the INFORM working group to share their own internal humanitarian needs scoring methodology and files, that were screened according to the following minimum set of criteria to ensure that the data were comparable to the INFORM Severity Index:

- Humanitarian crisis had to be clearly identified by type and associated to one or more countries
- A clear methodology or analytical process was utilized to score and/or evaluate the crisis
- To match the INFORM Severity Index timeframe the crises from the consolidated baseline will include 2018 crises and, where possible, an outlook for 2019 crises, cleaned for recent crisis such as natural hazards

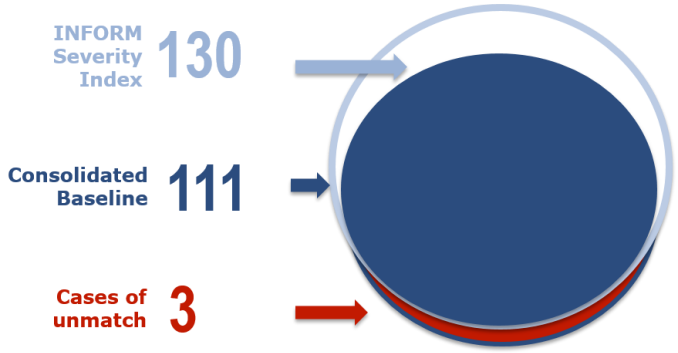
Eight contributors of data[23] were considered and only four met the above criteria. A total of 111 single crisis were identified and consolidated in a baseline, by name of crisis, type of crisis and country or countries involved. The organizations contributing to the baseline provide their own scoring system of the human needs and, in order to compare it with the INFORM Severity Index, a normalization process was applied to generate a 1 to 5 scale, followed by a screening of each record to verify that the original description and scoring was consistent with the normalized output. The consolidated baseline presents also limitations related to the fact that the original data collection was developed for specific purposes of resource allocation or prioritization within organizations, and therefore were not meant to be a global, systematic data collection, such as the INFORM Severity Index.

INFORM Severity Index captures the overall global figure of humanitarian crisis

Comparison between the cumulative total number of crisis identified by the INFORM Severity Index for the period January to June 2019 and the cumulative total number of crisis identified by the baseline – cleaned for duplicates shows that the INFORM Severity Index identified 130 crises while the baseline identified 111 crises, with only three cases of crises apparently not captured by the INFORM Severity Index (**Figure 22**).

[23] Preferably staying anonymous

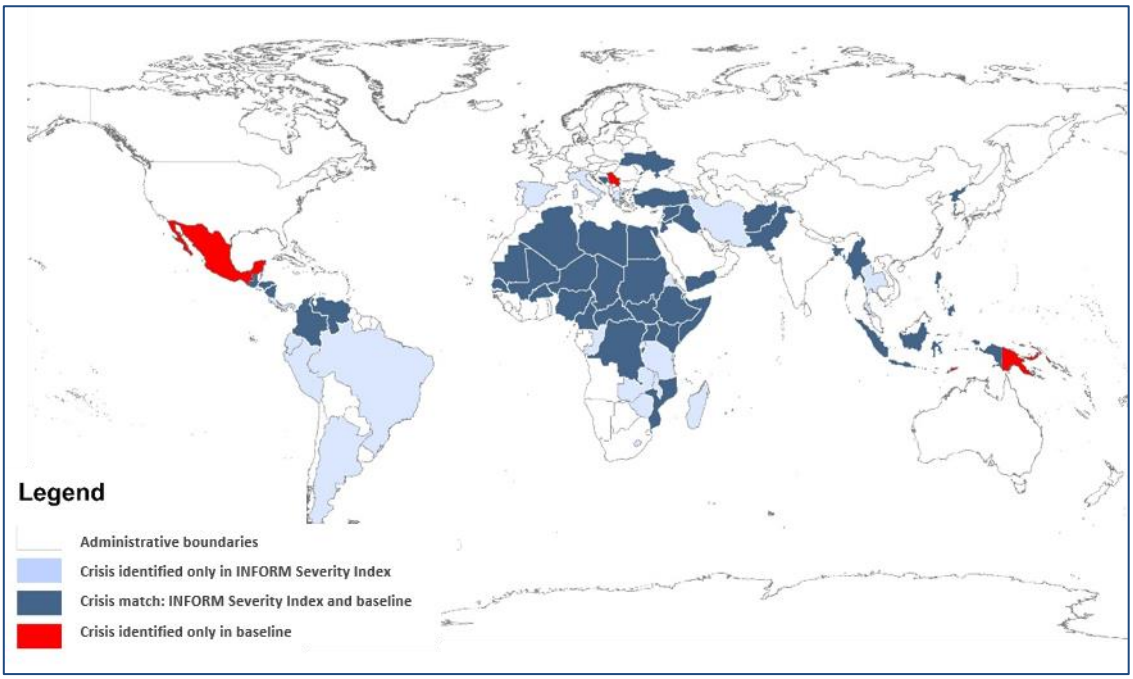
Figure 22: Number of crises captured by the beta releases of the INFORM Severity Index for the period January to June 2019 compared to the number of crises captured by the baseline



Source: Authors

INFORM Severity Index captures the spatial distribution of humanitarian crisis by country

Figure 23: Spatial overlay between INFORM Severity Index for the period January to June 2019 and countries affected by crisis identified by the baseline



Source: Authors

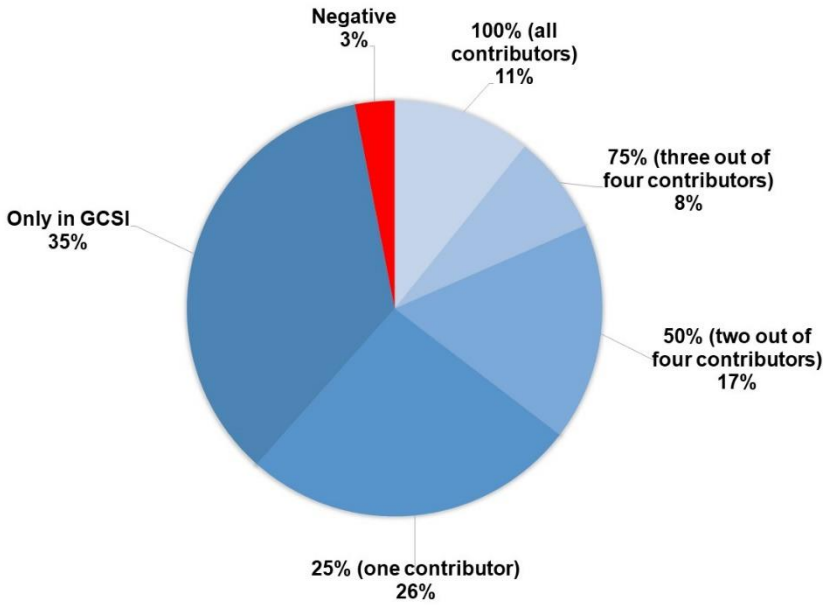
INFORM Severity Index has a good geographical match. **Figure 23** shows the geographic match between the beta version of INFORM Severity Index coverage and the baseline. Analyzing the actual crisis categories at country level emerged that the INFORM Severity Index captured two of the three apparently missing country-level crises: one (Papua New Guinea) was included in the INFORM Severity Index watch list and another one (Serbia) was part of a regional crisis. For both the cases the crisis category associated to each, "political crisis" and "refugee crisis", respectively, were matching the categorization made by the organizations contributing to the baseline. A third case,. a crisis associated to the country of Mexico, was reported by one of the four organizations contributing to the baseline, and haven't met the INFORM Severity Index criteria to define

minimum thresholds of human needs to calculate a crisis severity score. Yet, it provided valuable inputs to expand the way that the watchlist of countries is managed, and to allow third parties to submit requests to evaluate if a situation reported or perceived as a crisis can meet the criteria applied to define a humanitarian crisis severity.

INFORM Severity Index captures the type of crisis

In 11% of the cases all the contributors identified the same crisis and matching the INFORM Severity Index type of crisis. The matching rate changes to 8% for crises identified by three out of four contributors, and respectively 17% and 25% for crises identified by at least two and one contributor. As observed in the map, the INFORM Severity Index alone captures a wide set of crises (35% of the whole set for the period January to June 2019) and, as already explained in the previous paragraph a 3% of cases apparently were not captured by the INFORM Severity Index, but at a more in-depth analysis, two cases out of three were actually either included or monitored by the INFORM Severity Index, and a third one did not met the minimum thresholds of human needs to allow a calculation of the crisis severity score (**Figure 24**). In terms of crisis types, the highest match occurred for the crises classified as complex crisis and conflict while the lower match concerns the crisis type of international displacement.

Figure 24: Rate of number of crisis of same category identified by the INFORM Severity Index and the baseline, with breakdown of how match in the baseline by number of contributors



Source: Authors

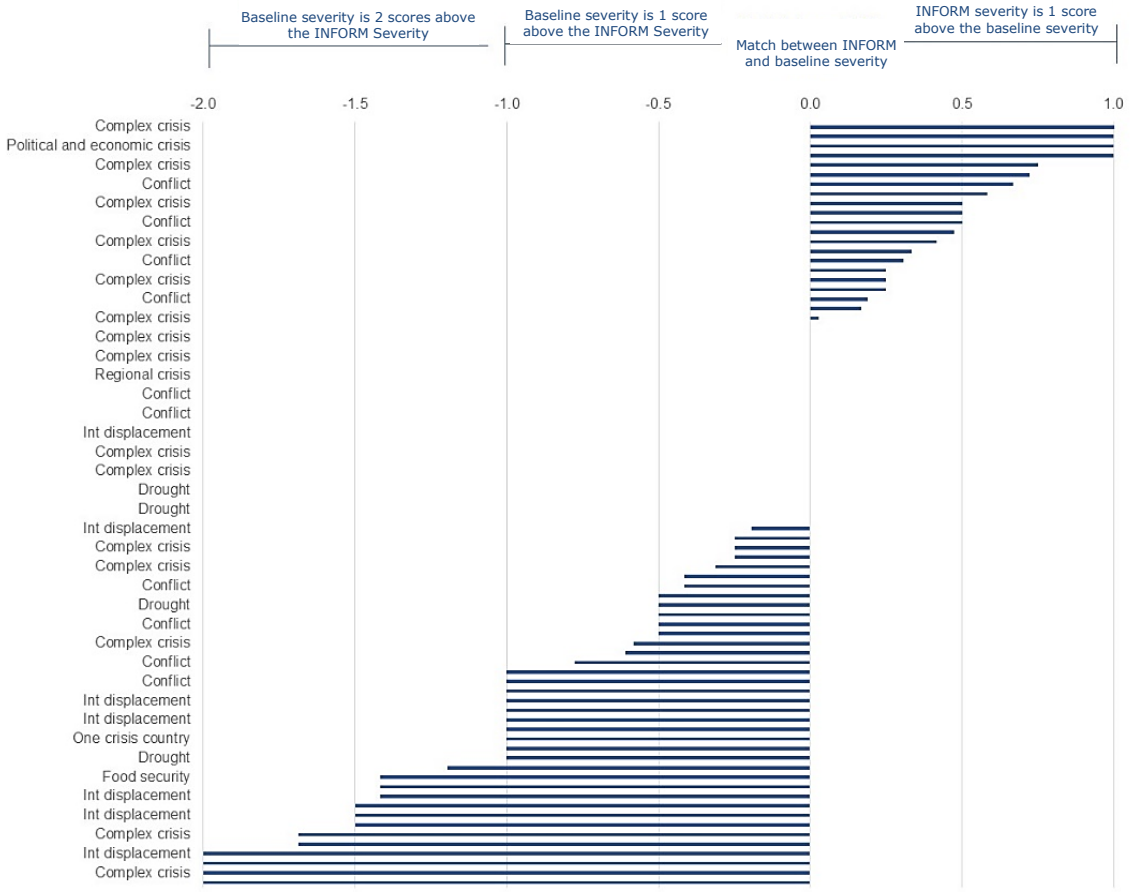
INFORM Severity Index captures the existing concepts of severity

The INFORM Severity Index value was compared with the equivalent severity score calculated for the crises with a categorization matching the INFORM Severity Index categorization for at least one record, and excluding all the cases identified only by the INFORM Severity Index.

The use of the value, rather than the score, provided more variability and details for the test. The comparison is affected by several limits, especially in consideration of the fact that the organizations contributing to the baseline have followed different methodologies to analyse the human needs of crises. Yet, the results of the

comparison (**Figure 25**) provide valuable inputs and suggestions for further development of the INFORM Severity Index, and better indications of the role of the concept of "Severity" applied to humanitarian crises.

Figure 25: Comparison of the INFORM Severity Index values with the baseline severity for matching crises



Source: Authors

The overall variability observed is in an interval of +1 and -2 values. The scores of more than 90% crises match within ±1 interval. Only the baseline value provided estimates of crisis severity beyond the value of 1, with four cases reaching the value of 2. It is interesting to highlight that from the analysis of six months of data, the INFORM Severity Index shows a more conservative result in evaluating severity, while the baseline tends more to show a higher level of severity for the same crisis. Considering the limitation in the original data, the focus on the variability can be on the values falling outside ±1 interval, and in this case is only the baseline to show variability. This observation is worth further development with more comprehensive dataset in order to evaluate if these early results are reflected in long time series. Similarly to the discrepancy observed in the matching of the type of crisis (**Figure 24**), even in the comparison of the severity value the crisis type of international displacement is characterized by high variability.

Annex 4. Beta version testing phase: Observed rate of update of core indicators

Indicators used in the INFORM Severity Index model are not meant to have a defined rate of update: the availability of new data largely depends from the actual humanitarian situation in the affected area, the availability of resources to conduct assessments and the access the persons of concern.

The observed rate of update of the indicators in the twelve months of beta version can provide a context for the score and for trend analysis (**Table 12**). The observed rate of update has been defined as % of update for the duration of the crisis on twelve months of Beta version:

- **Low**: below 30%
- **Medium:** 31 to 70%
- **High:** 71 to 100%

The data entered in the model at a certain time window can be valid for following periods for a specific indicator, since each indicator has its own time-sensitivity.

Yet, it is important to make sure that the timeframe in which the data is collected is clear in order to avoid misinterpretation in what a specific Severity score released at a point in time represents.

Therefore, the rate of update is meant to provide additional support to take informed decision on how a release is representative of the humanitarian situation at that specific point in time.

To help to isolate the variation in the score related to changes in the humanitarian situation from the variations due to changes in data source, it is recommended to verify the source tracking tab available in the log file for the period in which the variation is observed.

Table 12: Observed rate of update for the INFORM Severity indicators during the twelve months of beta version testing phase

INFORM Severity indicators	Observed rate of update	Expected rate of update
Affected area	Low	Low
People affected	Medium	Medium to high
People in the affected area	Medium	Medium to high
Fatalities	Medium	Medium to high
Displaced	Medium	Medium to high
People in minimal conditions - Level 1	Medium	Medium to high
People in stressed conditions - Level 2	Medium	Medium to high
People in moderate conditions - Level 3	Medium	Medium to high
People in severe conditions - Level 4	Medium	Medium to high
People in extreme conditions - Level 5	Medium	Medium to high
Fatalities in all crises	Medium	Medium to high
Humanitarian profile	Low	Medium to high
Impediments to entry into country	Low	Low[24]
Restriction of movement	Low	Low
Interference into implementation of humanitarian activities	Low	Low
Violence against personnel, facilities and assets	Low	Medium to high
Denial of existence of humanitarian needs or entitlements to assistance	Low	Low
Restriction and obstruction of access to services and assistance	Low	Low
Ongoing insecurity/hostilities affecting humanitarian assistance	Low	Low
Presence of mines and improvised explosive devices	Low	Medium[25]
Physical constraints in the environment	Low	Low

Source: Authors

[24] It needs to be monitored constantly to identify rapid changes, such as visa denial to humanitarian workers that can be in force for a limited time window

[25] Countries with active demining programs provide periodic reports on % of cleared areas

Annex 5. COVID-19 and humanitarian crises

The pandemic affects vulnerable groups in many ways. Restrictions on movement within and across countries can hinder food-related logistic services, disrupt entire food supply chains and affect the availability of food, thus jeopardizing food security for all people, and hit especially hard people living in the poorest countries. Lockdowns and economic recession are expected to lead to a major loss of income among the working poor: overseas remittances will drop sharply. While school closure affected in the beginning of the pandemic over 1.6 billion children, with nearly 370 million children missing out school meals provided by humanitarian programs. The secondary impact of COVID-19 – briefly defined as the impact beyond the health emergency and encompassing sectors such as food security, protection, nutrition and education – is most worrisome for communities in countries across Africa as well as the Middle East, because the virus threatens further damage to the lives and livelihoods of people already put at risk by poverty, conflict and fragile protection mechanisms.

Beyond the immediate humanitarian impact on health, the humanitarian sector deployed a number of tools, expert knowledge and data analysis to measure the impact on the world's most vulnerable persons of concern, as well as the socio-economic repercussions on fragile societies.

The rapid escalation of needs determined the need for the deployment of multiple instruments to provide humanitarian assistance the persons of concern in several countries already involved in pre-existent humanitarian crises.

In the early stage of the outbreak the primary focus was on mobilizing resources into emergency health and life-extension services, with the additional challenges determined by the change of the access patterns due to mobility restrictions.

Early evidence on the risk of a secondary impact to multiple sectors of the humanitarian response started to materialize through a number of indicators, such as the raising price of food commodities, discontinuity in the reporting of protection cases and the widespread loss of means of livelihoods. To acquire information on the impact of the COVID-19, several assessments have been conducted at sector and inter-sector level, to identify e.g., what are the implication for food security of the restrictions to migrant workers, or how the discontinuity in school feeding programs and the forced home-schooling will correlate with protection issues such as early child marriage.

Following the outbreak of COVID-19 in mid-January 2020, the United Nations announced a Global Humanitarian Response Plan in March, followed by an update of the original appeal on the 6th May 2020 (**Box 6**). The new tally adds funds requests on top of existing humanitarian response plans before the pandemic, since most crises have deteriorated as outbreaks spread.

Box 6: A timeline of initial humanitarian response to COVID-19, March to May 2020

The end of March 2020: the United Nations launched a US$2 billion coordinated global humanitarian response plan to fight COVID-19 in some of the world's most vulnerable countries. The COVID-19 Global Humanitarian Response Plan is being implemented by UN agencies, with international NGOs and NGO consortiums playing a direct role in the response

Early May 2020: the Response Plan was revised to include a $6.7 billion appeal

1st May 2020: the Emergency Relief Coordinator activated the UN Central Emergency Response Fund (CERF) that in a month has supported the launch of 37 country-level COVID-19 response plans

7th May 2020: 54 countries launched a response plan to COVID-19

Measuring the Severity of COVID-19 humanitarian crises

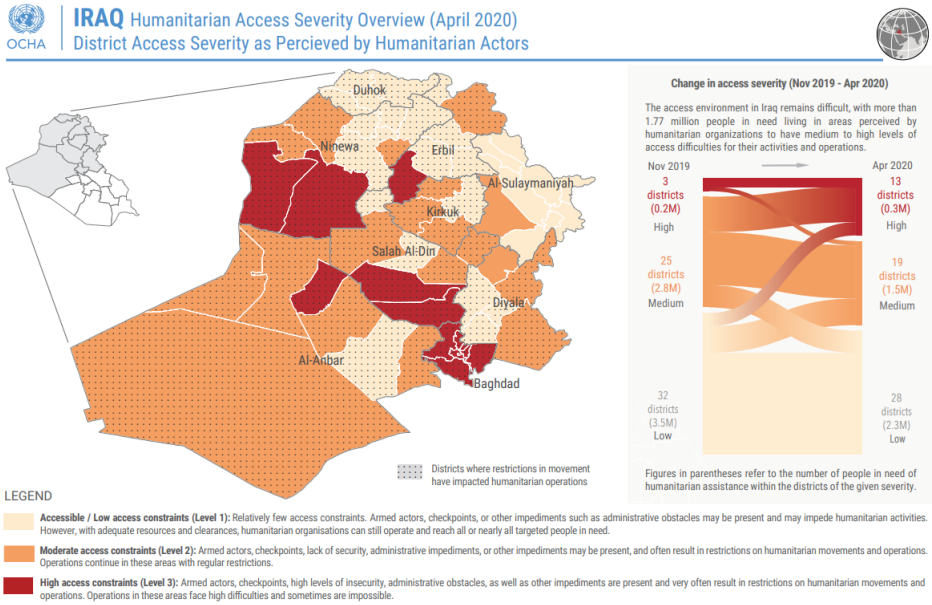
How the INFORM Severity Index is able to capture the dimension of severity of the humanitarian crises generated by the impact of the COVID-19 outbreak is a matter of high relevance to understand the suitability of the theoretical framework and underlying data to timely inform humanitarian actors (**Table 13**).

Table 13: Suitability of INFORM Severity Index theoretical framework for humanitarian crisis generated by COVID-19 impact

Impact of the crisis	Conditions of people affected	Complexity of the crisis
Data-rich environments have been able to identify the additional caseload due to the COVID-19 outbreak while other programs utilized the figures of the pre-existent response, especially in cases where the overall country population was already either exposed and/or impacted by a crisis.	The characterization of the conditions of the affected people is linked to the sector assessments that have been launched with different timing by response programs at country level Response programs that launched a country level response to COVID-19 have provided disaggregated figures of affected persons of concern, with a focus on the specific vulnerabilities characterizing the local crisis like, e.g., by affected groups – refugees and IDPs – or by number of beneficiaries left out by food assistance	Humanitarian access has been deeply impacted by COVID-19, with restrictions to movements applied to vulnerable groups and humanitarian aid operators. Where still possible to reach the persons of concern, especially refugees and IDPs, local governments have often implemented an authorization system that brought to the disruption and temporary suspension of several services.

Source: Authors

Figure 26: Change in access severity at sub-national level for the period November 2019 to April 2020, Iraq UNOCHA 2020



Source: UNOCHA. 2020[26]

While a systematic measure of the change in access is not yet implemented by country programs, several initiatives show how an increase of high constraints has been detected in the period of the COVID-19 outbreak. Along with an overall increase of the access constraints at country level, emerged also a variation of the access within the country level (**Figure 26**).

[26] https://www.humanitarianresponse.info/en/operations/iraq/infographic/iraq-humanitarian-access-severity-overview-april-2020

Annex 6. Data Collection Guidance

Introduction

This document aims to provide a practical guide on the data collection process for the INFORM Severity Index. The CrisisInSight team of ACAPS[27] has the overall responsibility for the data collection and analysis of the INFORM Severity Index indicators.

Team composition and data collectors

The data collection team is comprised by 6 information analyst, two middle level analyst focusing on qualitative and mixed methods analysis and a senior analyst. The analysts monitor the globe on a daily basis, mainly through secondary data review, using INGOs' and UN agencies reports, as well as international and local media and other sources. They are also responsible for developing a network of humanitarian informants in the relevant crisis countries. All relevant humanitarian developments identified are discussed within the team in joint analysis meetings and decisions are made on how to treat information that illustrates a humanitarian impact or humanitarian consequences. Contextual developments are also sometimes included when they have, or might have in the future, humanitarian implications.

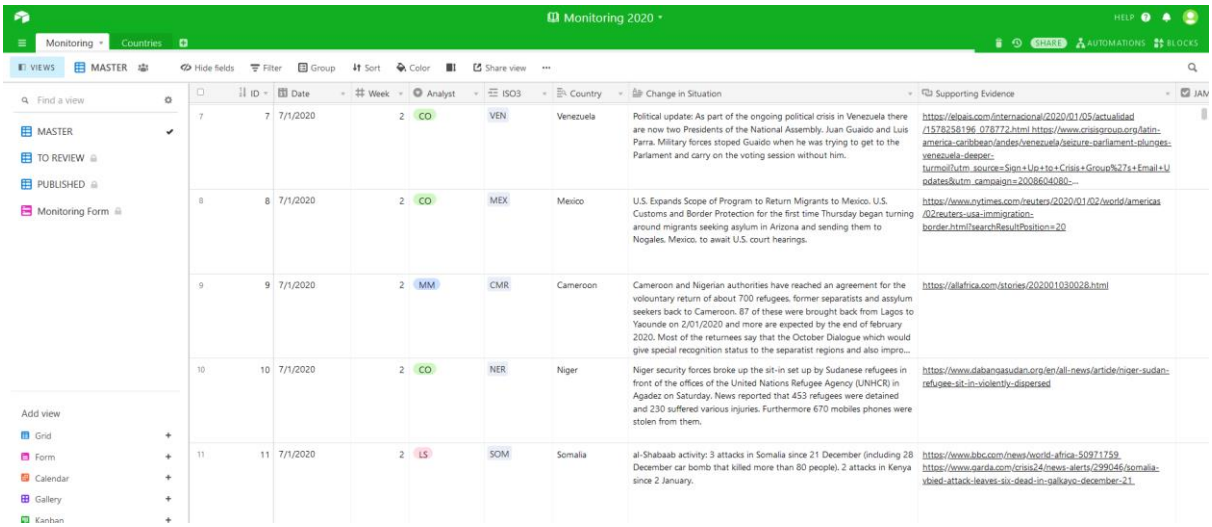
Countries Monitoring

Countries are allocated by Analyst for monitoring. Analysts monitor relevant sources for their assigned countries daily (usually each morning) to identify humanitarian developments. Humanitarian developments include:

- Changes in the humanitarian situation
- New data/information about humanitarian situation available
- Contextual, economic, or political information that affects the humanitarian situation (now or in future)
- Uncertainty/ambiguity about an event or piece of information
- Significant information gaps.

Analysts keep track of important sources (databases, portals, media sites etc) for their countries. All the relevant sources are then logged in the internal Daily Monitoring Tracker. All humanitarian developments identified are then discussed in the Joint Analysis Meetings.

Figure 27: Daily Monitoring Tracker



Source: ACAPS

[27] https://www.acaps.org/countries

Joint Analysis Meetings (JAM)

The JAM meetings take place twice per week and bring together the different monitoring outcomes of each analyst, and therefore of each crisis. The objectives of the JAM meetings are to

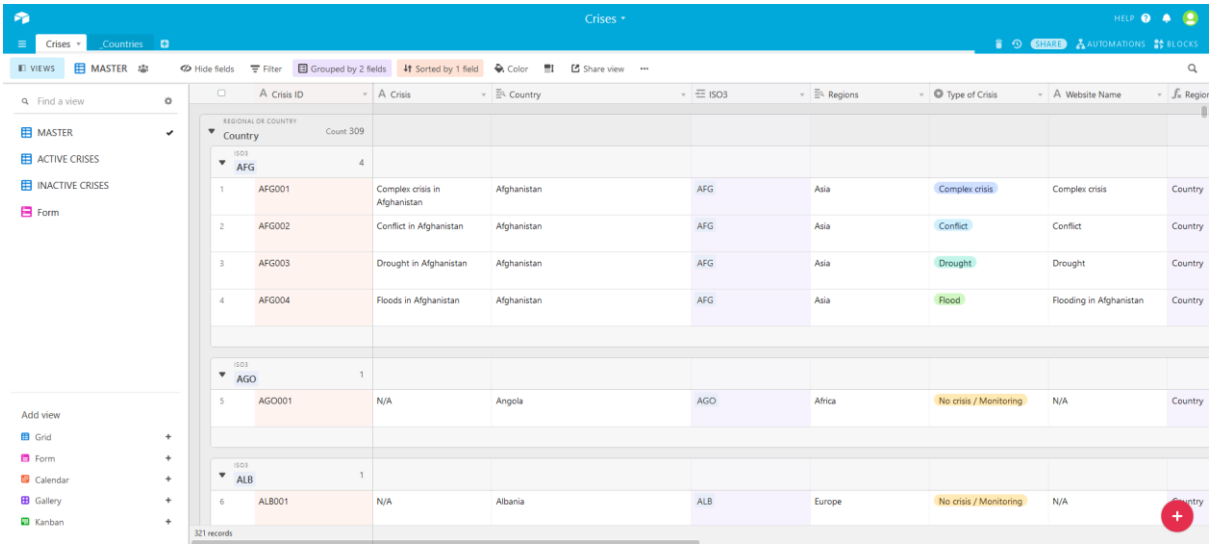
- Encourage joint analysis
- Decide on actions to take for Humanitarian Developments such as updating the severity index, updating the access index, identifying future risks, etc.
- Identify regional or cross-cutting themes
- Ensure shared understanding of global humanitarian situation

One analyst facilitates the meeting while the other analysts present humanitarian developments from the countries they follow. All agreed actions are tracked and followed up. The facilitator role is rotating among the CI analysts and changes every month. All issues discussed are recorded in the Daily Monitoring Tracker during the JAM. All decisions taken are actioned as soon as possible. It is the responsibility of the meeting facilitator to ensure that all info is captured.

Identifying a new crisis and entering it in the model

Once a new crisis has been identified, according to the criteria described in chapter 4.4.1, it is logged in the Crisis Identification and Code Generator. Similarly, to deactivate a crisis, the analyst marks the crisis as inactive in the same table.

Figure 28: Crisis and code Generator



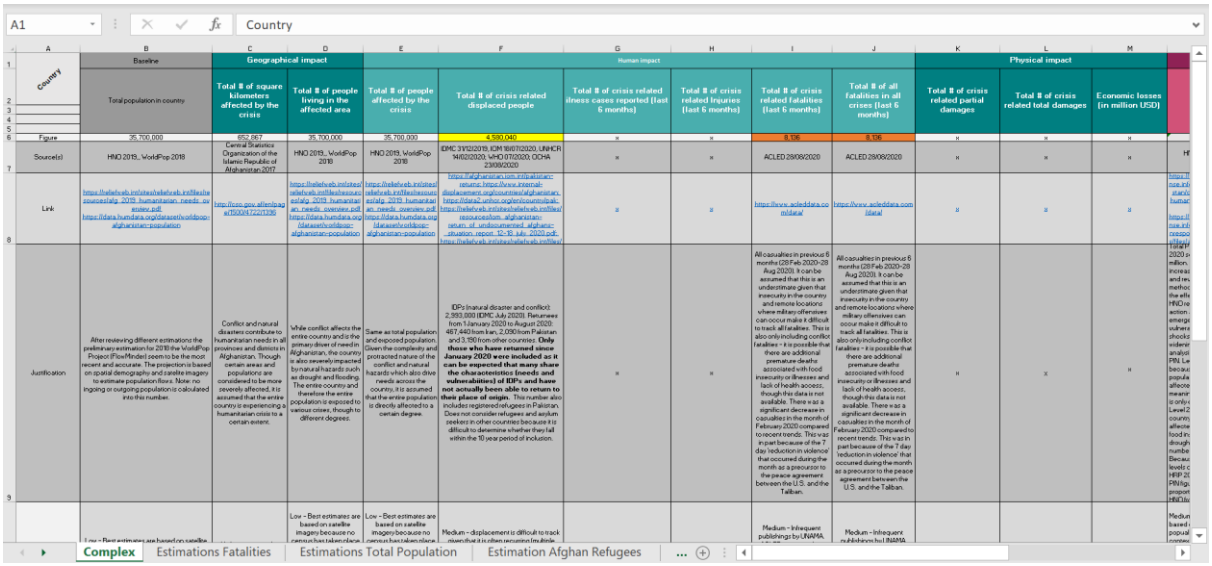
Source: ACAPS

Updating the Severity Index Indicators

All the updates relevant to the update of the INFORM Severity Index are processed as soon as possible throughout the monitoring time and on an ongoing basis. The update of indicators is not related to the monthly dataset release and is done on an ongoing basis and as new information and updates are identified by the analysts.

Each country monitored has an allocated country folder where all relevant baseline data, key datasets, and reports are stored. The main document in each folder is the data collection spreadsheet where is the working document where the analysts store the most recent sources and information that feed into the different indicators.

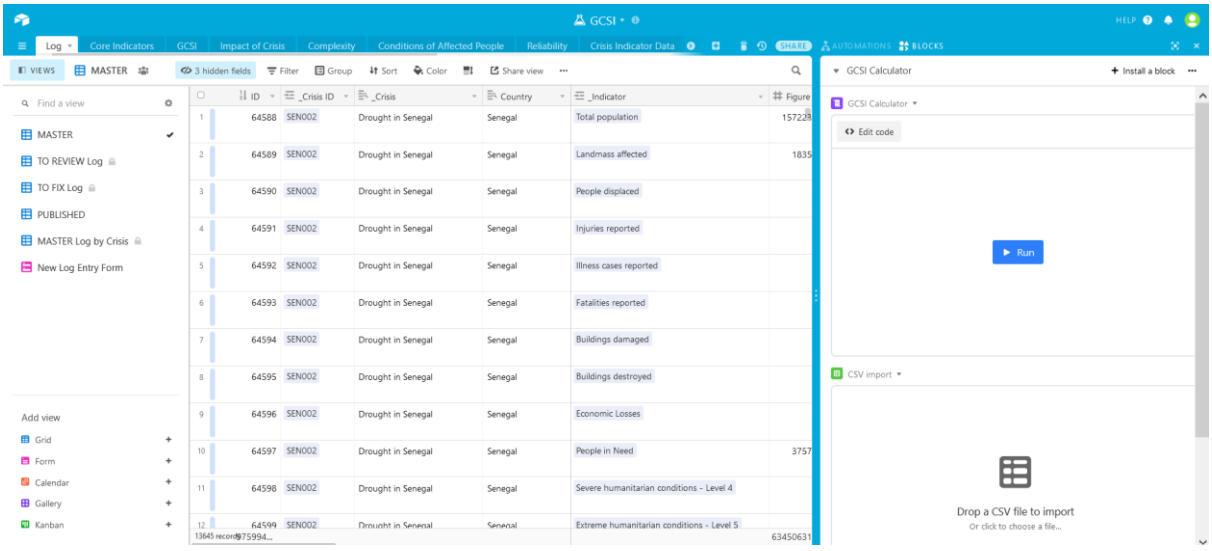
Figure 29: Afghanistan data collection spreadsheet



Source: ACAPS

The update for each indicator follows the INFORM Severity Methodology as described in chapter 4.4.4. Once an indicator has been updated by the analyst it is then logged into the ACAPS database hosting the INFORM Severity Index data and calculations. Once the indicator is logged the updated scores are generated.

Figure 30: INFORM Severity Index Log



Source: ACAPS

Dataset publication

The GCSI Monthly Dataset is uploaded to the ACAPS website and shared with INFORM partners on the last day of every month unless a new significant crisis occurs, in which case it may be updated ad hoc. The final scores and data are available in the ACAPS and the INFORM websites, uploaded in HDX, as well as through API.

Analytical Methodologies

The analysts conducting the data collection are trained on analytical techniques that ACAPS has developed over the years. Humanitarian analysts apply specific frameworks, structured techniques and analytical standards to review, evaluate and make sense of the often partial information available. More information about the materials and tools and the analytical practices and workflows used can be found at https://www.acaps.org/methodology/analytical-thinking.

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