Disaster Risk & Forecast-based Financing Design

A guide to using Household Economy Analysis

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Cover image

Tea pickers in Kenya's Mount Kenya region. Picture taken for the Two Degrees Up project looking at the impact of climate change on agriculture.

Contents

Introduction to Disaster Risk Financing and Forecast-based Financing

Disaster Risk Financing (DRF) and Forecast-based Financing (FBF) are new forms of humanitarian action that move away from a solely reactive approach to crisis, and instead encourage the humanitarian and development sectors to take a more systematic and robust approach to managing and financing activities to address emerging risks.

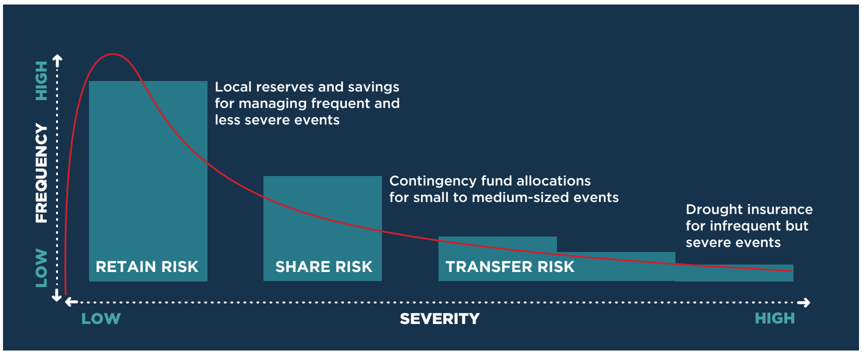
One key reason why humanitarian action has traditionally arrived late[1] is that it is often triggered by indicators that are based on impact and loss, and is responding to an event that has already occurred. Equally, the development sphere has traditionally failed to recognise the dynamism of the context in which longer-term work is implemented.

DRF and FBF take a different approach. These techniques focus on monitoring the early risk indicators of a forecasted, impending or imminent crisis, and using those indicators to release financing earlier than would usually be the case. DRF and FBF therefore provide the opportunity both to avert and mitigate the crisis, and to prepare for more timely emergency responses, thereby minimising losses and saving lives. These approaches enable us to act earlier, either before the shock has occurred to enable households to prepare and manage the consequences ("early action"), or very soon after ("early" or "timely response") to limit the impact.

DRF and FBF are similar in that they bring together scientific risk analytics, contingency planning and risk-based funding. They can be developed across a range of relatively slow-onset and predictable natural hazards, such as drought, flooding, heat and cold waves, and even more sudden-onset crises, such as landslides, earthquakes and tsunamis. Conflict and other human-induced crises can also be monitored, and in some cases predicted, allowing the risks to be better managed.

However, DRF and FBF also differ in that Disaster Risk Financing has an additional focus on the use of financial instruments and financial risk management tools to manage risk and fund a response, ex ante or ex post. DRF looks at "layered financing" options – the use of separate but complementary funding mechanisms for crisis events. An example of this is the use of insurance services for the most severe event to complement existing humanitarian and development funding channels, alongside national mechanisms: financing mechanisms are "layered".

FIGURE 1 DRF FINANCIAL RISK LAYERING APPROACH

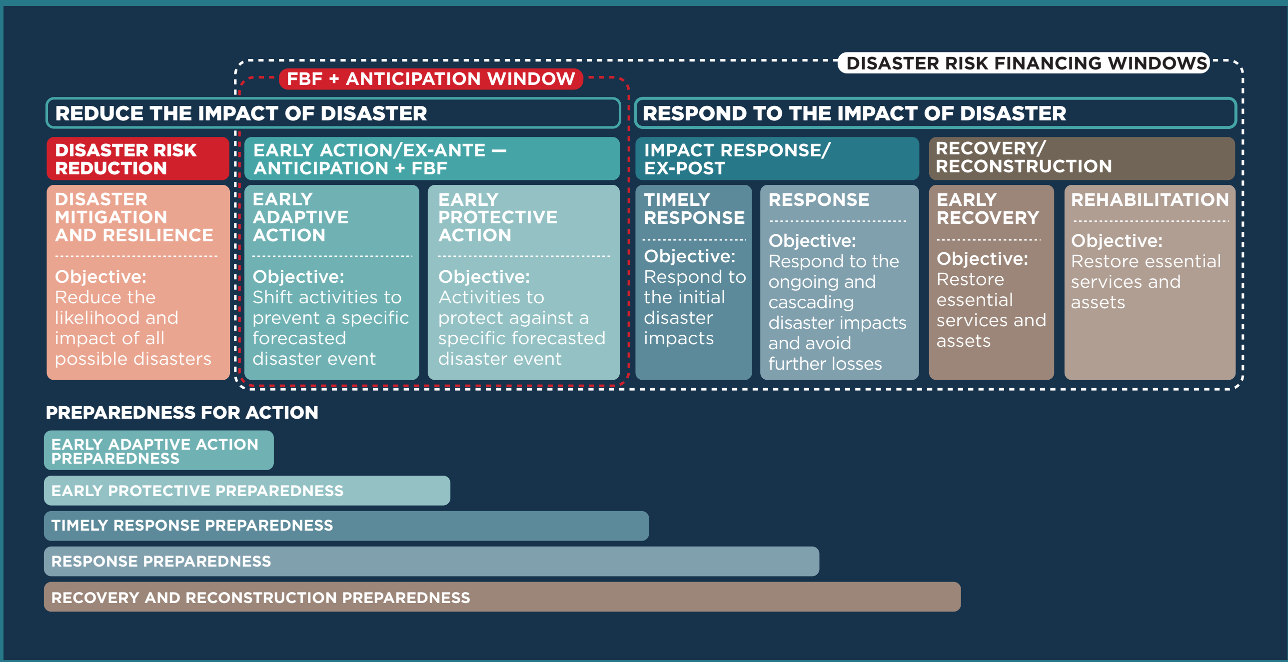


1 *For additional reasons see: https://policy-practice.oxfam.org.uk/publications/a-dangerous-delay-the-cost-of-late-response-to-early-warnings-in-the-2011-droug-203389.*

Essentially, DRF is an overarching approach encompassing:

- **SCIENCE-BASED RISK MODELLING -** allows us to understand and quantify the risks of shocks in our areas of operation. The model allows a primary trigger to release financing based on a risk threshold. It often comprises a hazard, vulnerability, and coping capacity component, and includes a way to quantify the financial need.
- **CONTINGENCY PLANNING** (also known as "scenario-based response planning") - outlines the activities that will be carried out, when and by whom, in different crisis scenarios thereby facilitating a coordinated and appropriate response in an early warning timeframe. The plan creates a line of sight between what people at risk are doing and need at a specific point in time, the response actions to meet that need, and the scientific trigger and financing required.
- **PRE-POSITIONED FINANCING -** can include a suit of financing instruments, such as insurance mechanisms, as well as traditional humanitarian pooled funds. These instruments automatically release funding according to pre-defined triggers based on data. Financing takes a risk-layering approach, with contingency funds used for more frequent but relatively minor events and insurance pay-outs made only for less frequent but more severe events.

FIGURE 2 WINDOWS OF OPPORTUNITY



Each window provides the opportunity either to manage risk and reduce impacts, or to respond to impacts. To be successful, each of these activities requires preparedness and planning in the run-up to implementation. For each window, the opportunity for preparedness and planning activities is reflected in the lower horizontal bars. While much preparedness occurs over the long term in DRR work, more dynamic preparedness actions may begin once an early warning of a specific event has been sounded. In each window of action, direct risk management or response activities may be taking place alongside preparedness actions for a following window of action. Each action should have a clear objective within one of these vertical or horizonal bars.

FBF is one approach within a wider set of possible DRF windows of action. The DRF approach can be applied to early action, timely and ongoing response as well as recovery and rehabilitation. Ensuring predictable, data triggered money is available, when it is needed, to implement a pre agreed plan for various disaster management objectives across a crisis timeline.

Household Economy Analysis: an overview

What is Household Economy Analysis (HEA)?

HEA is a unique methodological framework that determines whether households have the food and cash they need to survive and prosper.[2]

The food and livelihood focus of HEA means that the approach is most useful in the design of interventions focused on household economy, and with events that primarily impact livelihoods and food security (such as droughts, floods, heatwaves and market prices). However, the methodology can be adapted to be applied more widely.

Knowing whether households have “enough” resources to meet their needs requires quantifying thresholds against which their access to resources can be measured.

HEA establishes:

1. How people in different social and economic circumstances obtain the food and cash they need
2. Their assets and opportunities, and the constraints they face
3. The options available to them in times of crisis, such as drought, flood or increasing food prices.

The HEA framework uses this information to:

1. Quantify access to food and income for households across the wealth spectrum in a specified timeframe (either a baseline, current year or season)
2. Identify the kind of intervention needed, by whom, how much and for how long
3. Predict when and where households will require assistance.

HEA defines household access against two thresholds:

- The **‘survival threshold’**: basic food (kilocalories) to meet households’ annual kilocalorie needs, and enough cash to meet their basic non-food survival needs (such as drinking water for humans and cooking fuel)
- The **‘livelihoods protection threshold’**: survival needs, plus the income necessary to cover basic household expenditures (such as basic healthcare, education and livelihood inputs), as well as the cash needed to cover other essential goods deemed necessary by communities (for example, tea and coffee).

A household falling below one or both of these thresholds indicates that some kind of intervention is necessary to save lives and/or protect livelihoods.

The HEA framework can model scenarios to identify how different groups of households are likely to be impacted. This is particularly useful for enabling effective forecast-based action.

2 *__HEA for Programme Planners and Policy-makers__, the Food Economy Group and Save the Children, 2008, available at: https://www.heacod.org/en-gb/Published%20Reports/HEA-Guide-for-Policy-Makers.pdf.*

FIGURE 3 THE HEA ANALYTICAL FRAMEWORK - A SIMPLIFIED ILLUSTRATION

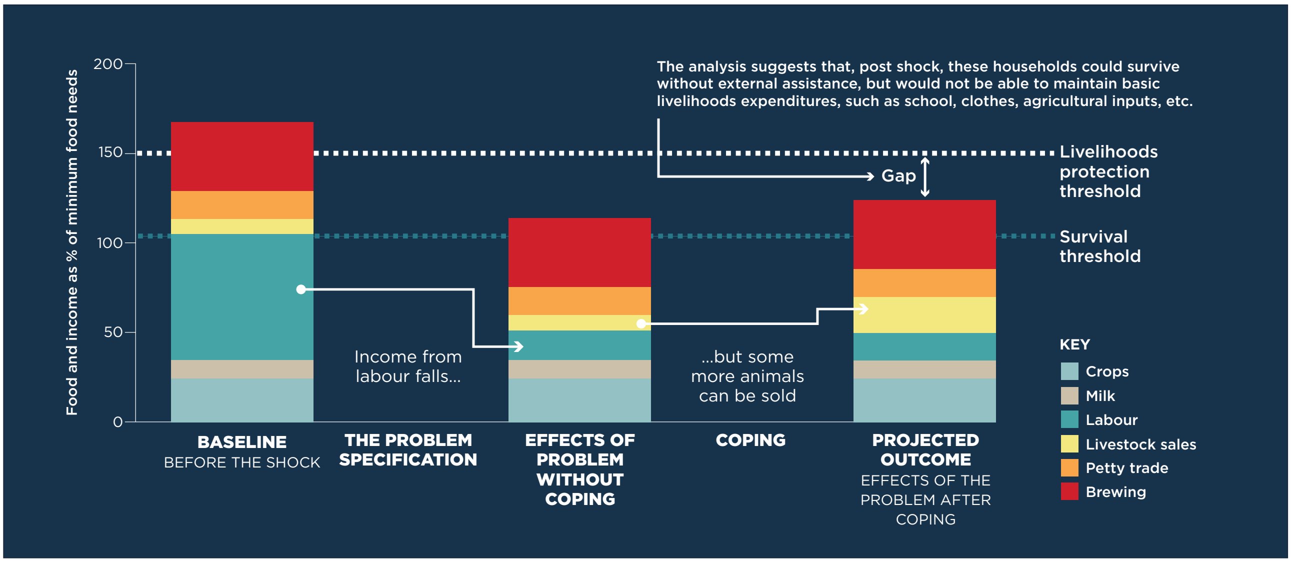
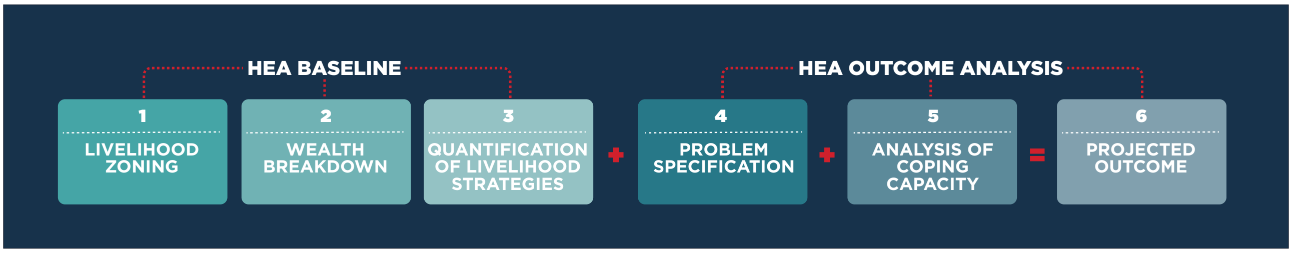


Figure 3[3] illustrates the HEA framework. The first bar represents the baseline year (before a shock). Household food and cash income are converted into their kilocalorie equivalents and compared to the standard of 2,100 kilocalories per person per day. In this case, they are above both thresholds (survival and livelihood protection) and therefore meeting food and livelihoods needs.

The second bar shows the impact of a shock; we can see that households are no longer meeting their livelihood needs but can still meet their food needs. The third bar incorporates household coping strategies; as a result we see a slight increase in overall income, but not enough of an increase to meet households' livelihoods needs.

The HEA framework comprises two main steps - the Baseline and the Outcome Analysis - each of which has three components. Details of each component are given below.

FIGURE 4 HEA OVERVIEW



The Baseline

The HEA Baseline provides a foundation for analysing households' needs and livelihood patterns. It is the starting point for understanding and predicting how households will cope in the event of a shock or hazard, such as a drought or flood. A Baseline, or "livelihoods profile", represents a "normal year"[4] in a defined livelihood zone. By understanding how households access food and cash in a normal year we can project how a forecasted or likely shock (such as a drought) will impact these food and income sources. The Baseline is established through key informant interviews and focus group discussions at district, community and household levels.

3 *Diagram taken from* ***HEA for Programme Planners and Policy-makers.***
4 *Sometimes referred to as a "reference year".*

- **KEY STEPS:** Livelihood zoning, wealth grouping and quantifying livelihood strategies.
- **KEY TOOLS:** The Baseline Storage Spreadsheet (BSS) and data collection forms (Forms 1, 2, 3 and 4).[5] The BSS is an Excel spreadsheet comprising multiple sheets in which the user enters data on food, income and expenditure collected through the baseline fieldwork. The BSS calculates total food, income and expenditure, information which, combined with field knowledge, tells a logical story about how households make ends meet.[6] The BSS should be finalised by an HEA practitioner who has completed relevant training, and should meet the standards established by the Food Economy Group (FEG).[7]
- **MAIN METHODS:** Key informant interviews, focus group discussions and secondary data. Data is collected from 8-12 villages within a livelihood zone for a standard baseline.[8]

For additional details on the steps of the HEA Baseline, please refer to the Annex 2 and the ***HEA Practitioners Guide***.[9]

Having an HEA Baseline in place is a pre-requisite for carrying out the remaining steps of the methodology detailed in this guide.

Outcome Analysis (OA)

The Outcome Analysis (OA) investigates and quantifies how baseline access to food and cash are likely to change as the result of a particular hazard or shock.

For this guide, the Dashboard has been selected as this is the simplest to demonstrate, however were this exercise conducted nationally for all livelihood zones, the LIAS would be more efficient as it is more useful for carrying out simultaneous analyses for multiple zones.

KEY ELEMENTS OF OUTCOME ANALYSIS

- **KEY STEPS:**
  - Quantifying the impact of the shock on household food and cash sources
  - Analysing household coping capacity
  - Calculating the final impact the shock in terms of the survival and livelihoods protection thresholds.
- **KEY TOOLS:** Livelihoods Impact Analysis Spreadsheet (LIAS) or "the Dashboard".[10]
- **MAIN METHODS:** Primary and secondary data collection and projections or making informed assumptions based on forecasts or likely scenarios.

5 *Forms to collect data from/ via: district key informants, markets, community representative, and wealth groups.*

6 *For additional details on the BSS, refer to the Part 1 of the Team Leaders Supplement chapter of the **HEA Practitioners guide**. (https://www.heacod.org/en-gb/Published%20Reports/The-Practitioners-Guide-to-HEA.pdf).*

7 *FEG is a livelihoods consulting group who have been on the leading edge of livelihoods-based food security analysis since 1998 http://foodeconomy.com/ FEG's senior partners played a central role in the initial design, implementation and continued development of HEA.*

8 *A "rapid" version has been developed, primarily to be used in contexts where resources are limited. Because less information is collected, rapid HEA baselines are valid for only 1 year, as compared to a standard baseline which is valid for around five to ten years, or until livelihoods have significantly changed. This document focuses on the use of a full baseline.*

9 *https://www.heacod.org/en-gb/Published%20Reports/The-Practitioners-Guide-to-HEA.pdf.*

10 *Note that a national OA tool also exists, however this document will focus on the use of the Dashboard and LIAS, the most commonly used OA tools.*

The Outcome Anaylsis comprises of three key steps:

1 PROBLEM SPECIFICATION
2 ANALYSIS OF COPING CAPACITY
3 PROJECTED OUTCOME

1 Problem specification

OVERVIEW: quantifying an identified shock's impact on households' food and cash sources and expenditures compared to the Baseline.

This step entails using the baseline information to identify households' most important sources of food and cash (their "key parameters") and assessing how these will be affected by the shock (for example, assessing how the price of rice will be impacted by a forecasted drought). Understanding the magnitude of the shock is essential to this assessment. Measuring the impact of a hazard on household food and income involves using crop and market price monitoring systems, national seasonal assessments and meteorological information. This is expressed as a percentage of the Baseline (for example, during the shock year the price of rice is 25% more than in the baseline year).

A 'key parameter' is a source of food, income or expenditure that contributes significantly to total food or cash income (usually 5% to total food and income for at least two wealth groups) such that a reduction in access to that one source would have a significant effect on total access.

2 Analysis of coping capacity

OVERVIEW: assessing how households might cope with a shock, and the economic impact of that coping.

This step requires practitioners to use information on coping mechanisms collected during the baseline fieldwork. In HEA, the contribution of coping strategies is first quantified and then integrated into the Outcome Analysis. The OA technician sets the level of coping for that particular analysis, from no coping strategies implemented through to all strategies included.[11]

3 Projected outcome

OVERVIEW: calculating the overall impact of the shock against the survival and livelihoods protection thresholds.

The final step incorporates households' coping capacity to determine where different households fall in relation to the two thresholds. The calculation is made by wealth group. The results provide information on the specific deficit (or surplus) against the threshold for each wealth group in cash and kilocalories;[12] the likely timing of the deficit (or surplus) (by month), and the number of households likely to face the deficit (or surplus).

11 *The default option is to include all strategies, but there may be circumstances where selecting a lower level of coping might be appropriate.*
12 *Kilocalorie calculations are based on the cheapest staple consumed in the livelihood zone.*

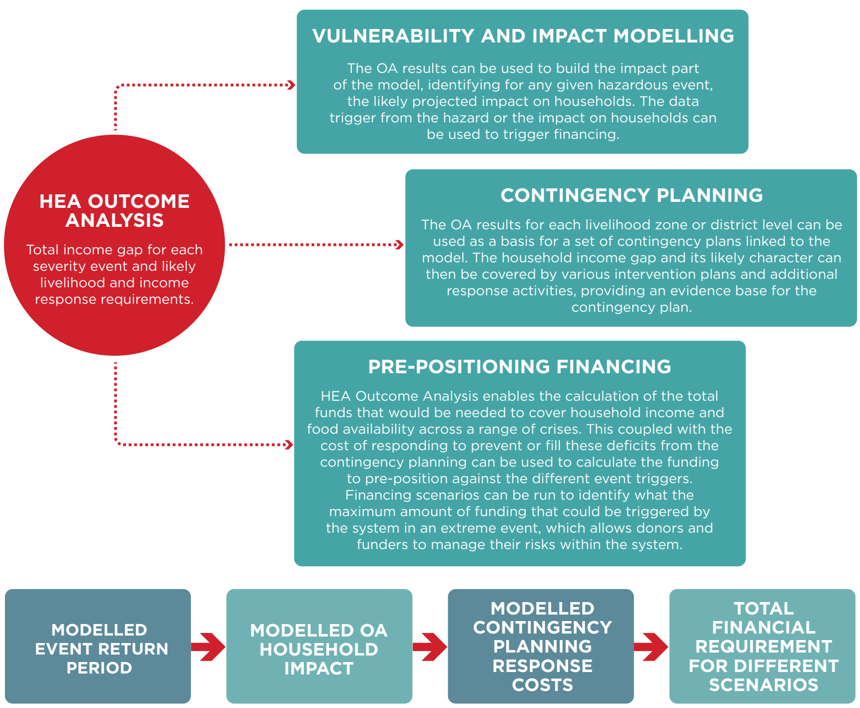
Applying HEA to DRF and FBF

As outlined above, DRF and FBF depend on the prediction of how a hazardous event – such as a drought – is likely to impact people, and the amount of financing needed to mount an action to protect those people against its worst effects. This prediction is often made using a set of data indicators and data models – a mathematical system combining multiple indicators (such as rainfall or river level) – to forecast the likelihood of disaster events. The varying severity and frequency of these events is referred to as a "return period event" or "a one in xx-year event". For example, a one in 30-year event depicted by the data model would be a severe event, whereas a one in three-year event would be a mild event. For each variation of severity and return period, the model can provide a picture, or results, for all possibilities. The financing for these systems is attached to a predicted return period threshold, or a forecasted one.

The OA can model different scenarios based on forecasts or likely situations, including events of varying severity (for example droughts or floods of differing magnitude). The OA will provide a set of modelled impact outcomes for households' overall income compared to the two HEA thresholds detailed above.

For example, the model may display a one in eight-year drought event, where yields from specific crops are modelled to drop by a certain percentage compared to normal. This information can be used to develop a problem specification for key parameters which can be used to drive an OA. The results will show the overall outcome as compared to the HEA thresholds, detailing any food and/or income gap that may result. The OA also details the number of households that will require support and the amount that will be required; this facilitates response analysis and the selection of appropriate interventions. This process can be re-run for different return period events; for any event that is predicted, a corresponding household income gap can be identified. **This document guides practitioners on how to do this.**

FIGURE 5 RISK FINANCING SYSTEMS



The results of this work can be used to inform the design of risk financing systems in three specific ways:

1 **VULNERABILITY AND IMPACT MODELLING**
2 **CONTINGENCY PLANNING**
3 **PRE-POSITIONING**

Who is this guide for?

This guide is intended for people working in DRF and FBF, as well as those who have a working knowledge of HEA or have completed HEA Outcome Analysis training. Please note that undertaking this process without someone trained in HEA OA, or a consultant from the FEG, is not advised: HEA is a technical approach that needs to be applied correctly to have an accurate outcome.

More specifically, the audience for the guide includes IFRC and the Red Cross Climate Centre, the Start Network and member NGOs, UN agencies, governments, insurance and modelling companies, development banks and technical bodies such as the Centre for Global Disaster Protection.

How to use this document

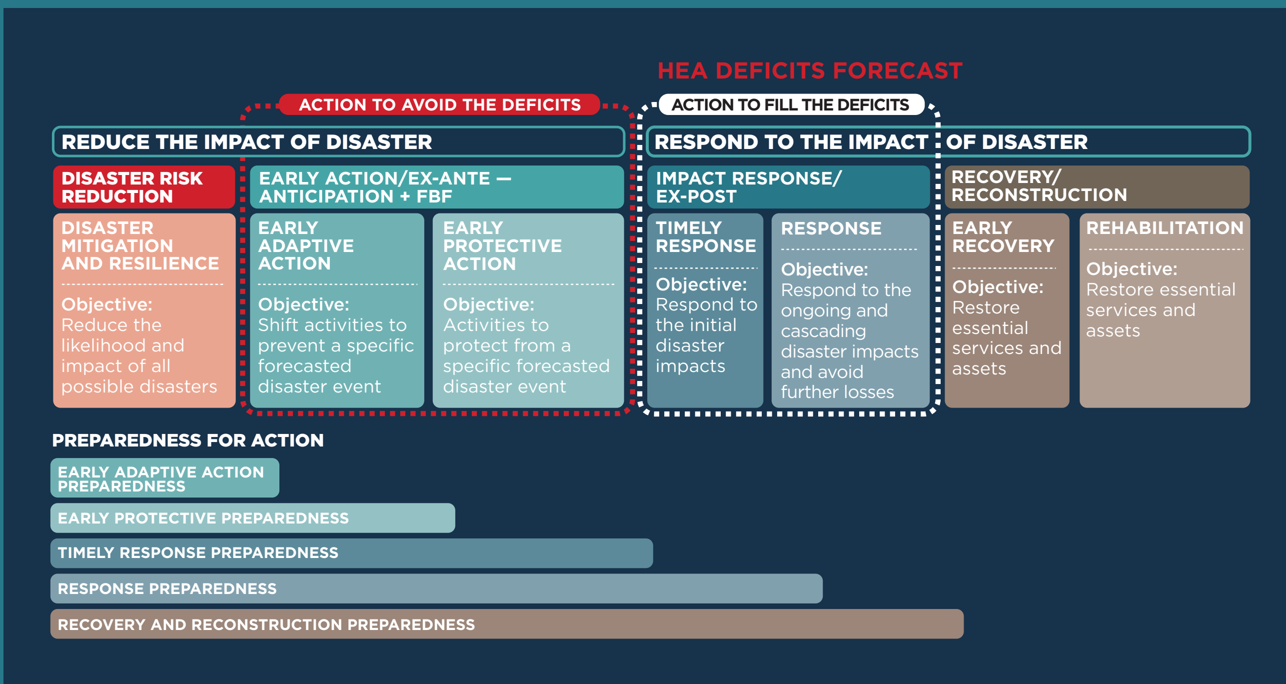
This document aims to support those working in Disaster Risk and Forecast-based Financing to utilise HEA in a way that can be beneficial to the development of DRF and FBF systems.

The guide can be used alongside existing HEA resources.[13] It does not provide full HEA instructions but outlines how HEA can be used in the design of different components of Disaster Risk Financing. This includes using HEA as an impact model, in the contingency planning, and in the pre-positioning of financing and financial layering of risk. It is assumed that users will have completed Outcome Analysis[13] training before they embark on the steps outlined in this document.

It is hoped that by providing the impact and quantitative link between the model, contingency planning and costing, the guide will create a clear line of sight between risk modelling and risk response actions, as well as common assessment of impact that can be corrected and improved throughout the system. Moreover, it is expected that by modelling likely scenarios, actions can be triggered before households face the impact of the shock within an FBF and anticipation window (or as soon as they feel it in more timely response), ultimately safeguarding food security and livelihoods from the worst effects of the shock (i.e. the loss of livelihood or extreme hunger).

The guidance should be used to model the impact of selected forecasted events, which can allow for the evidenced formation of contingency and response plans within different windows of action in a crisis calendar. The predicted quantified impact on households (known as "deficits" in HEA if household income is negatively impacted) can be used to identify appropriate actions to implement forecast-based action (early action) to avoid the deficits, or timely (response) to fill the deficits.

FIGURE 6 INTERVENTION WINDOWS



13 *https://www.heacod.org/engb/ Pages/HEAResources.aspx. Users may also want to refer to the Situation and Response Analysis Framework (SRAF), which provides guidance on how to use HEA to develop detailed and appropriate contingency plans for timely humanitarian response (https://www.heacod.org/engb/Published%20Reports/SRAF%20Guidance.pdf).*
14 *Refer to subsequent sections for details on the HEA framework and steps.*

Why do we need HEA in DRF and FBF?

In recent years many DRF and FBF projects have tried to develop vulnerability assessments as part of risk analytics with the ambition of forecasting the likely impact of an identified hazardous event on an exposed population. The conceptualisation of a population's vulnerability to varying shocks and the severity of the potential impacts is extremely complex.

The challenges include:

- **COMPLEXITY CLOUDS TRANSPARENCY** – Many systems have attempted to reflect this complexity with a range of vulnerability characteristics to identify who is at risk of the hazard. However, causal vulnerability factors that influence how a community or household is impacted are highly complex and reach into long-term development deficiencies, as well as governance and political issues. The complexity often clouds the decision making that needs to take place (for example, decisions on when to act, what to implement, who to target and so on).

- **COHERENCE BETWEEN IMPACT MODELLING AND RESPONSE** – To date, impact modelling has not systematically triggered appropriate response. Logic would dictate that the way a risk model characterises vulnerability and the potential impact of an event, should translate directly into the type of response that is mounted. This is not always the case. For example, if a vulnerability and impact assessment characterises the exposure of peoples' houses to a flood, the number of people likely to be impacted, and the funding that should be released, would be based on the number of houses that need to be rebuilt. If the response then mounted has nothing to do with house rebuilding, but instead provides another kind of response such as water and sanitation, the logic of the financing and risk coverage system starts to break down. The amount of money released was based on the sum needed to cover the risk of losing a certain number of houses: this was the picture of risk. The need may have been for a water and sanitation response, but this is a different depiction of risk. Therefore, the needs that the released funding covered would be unknown, and gaps in funding or overpayments leading to inefficiencies, would occur. The financial risk layering and coverage, and the response, begin to lose coherence.

  However, this does not have to be a fatal flaw in these systems; with the use of any model of impact there will be a significant degree of divergence from reality – sometimes referred to as "basis risk". Corrective systems can be put in place. However, the ability to assess the performance of the system end-to-end when there is this disjoint means that feedback loops can become problematic.

- **ACCOUNTABILITY IN DECISION MAKING** – The complexity of some vulnerability metrics, and the fact that they are developed at some distance from the reality of the people at risk, makes it difficult for those same people to disagree with or question the depiction of their vulnerability in the model. Many vulnerability and impact models use complex mathematics, ratings, weightings and judgements based on situations outside of the reality of the people at risk (for example, the concept of "good governance"). This presents a challenge to transparent and accountable risk decision making.

- **STANDARD IMPACT METHODOLOGIES** – There has also been a lack of standard and scalable methods for vulnerability and impact analyses, or methodologies that practitioners are familiar with and able to run and update on a regular basis. Given these challenges, it was identified that an impact methodology was needed to provide both a transparent method for quantifying the vulnerability and likely impacts of a given severity scenario on household financial needs; and a way to scale the results to sub-national and national levels to estimate financial requirements for different severity events at broader scales. It was identified that the methodology should also have a number of characteristics including:

  - **not reinventing the wheel and instead building on established methods, resources and approaches**
  - **being capable of quick reassessment and updating at the time of crisis and when moving from contingency planning to implementation plans, so as to adjust for the live situation rather than just modelled impact**
  - **having modelling capability but being easy to pick apart so that inaccuracies could be identified**
  - **being easy to explain to targeted communities so that they can understand the results and can question its robustness.**

Because of its advantages described above, HEA was identified as a potential solution to these challenges. The Situation and Response Analysis (the SRAF) also loosely informed the thinking of this document.[14]

14 *https://www.heacod.org/en-gb/Published%20Reports/SRAF%20Guidance.pdf.*

Limitations of HEA for DRF

There are some limitations to the approach taken by this guide. Firstly, whilst HEA provides a quantitative approach to identifying the impacts of a hazard event on household income and resources, it does not look at the wider impacts of an event. For example, a flood may cause the loss of a healthcare facility or a road; HEA can model the consequences of the flood on household expenditure and income, but it will not assess the cost of these wider community asset losses. Therefore, in contingency planning work, additional impact costs outside of HEA analysis need to be factored in to create a total response cost, depending on what the objectives of the action is.

The proposed methodology is also used to cost early actions or timely responses. In doing so, it assumes that the cost of these actions is as great as the predicted impact of the shock on household income. However, the evidence may paint a different picture. For example, in a very poor household, the projected food and income deficits (from projected loss of livestock) may be calculated at $20 a month, but the cost of preventing the livestock loss (fodder for a month or two) may be less than $20. Currently, the cost saving brought about by early response at this stage cannot be factored in due to lack of operational experience and early action cost benefit analysis; in time, this will grow and inform approaches such as this.

Thirdly, the approach taken is that of scenario-based impacts used in real time to trigger financing and action. However, in a real time event, the impact on households of a particular scenario is likely to differ to some degree. This is true with all forecast-based models: they will never predict events with total accuracy. It is hoped that this can be minimised through participatory design but nonetheless, a method of quickly revaluating the results and adjusting the financing will be needed to manage basis risk of the system (divergence of the modelled result and reality).

A shepherd tends their flock in Maidanahalli, Karnataka, India

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HEA Outcome Analysis tools

For DRF and FBF we want to know the OA results at different spatial levels for different purposes, for example for triggering action or financing, or for understanding what type of response is needed and where. If a relatively localised system has been built, completing the OA for just one or two livelihood zones may be most appropriate. However, if you are looking at a national risk financing system, you may need to undertake the OA exercise for each of the country's livelihood zones. Depending on the level of analysis, the most appropriate OA tool can be used for the analysis: the integrated spreadsheet, the national spreadsheet or the Dashboard. These first two tools are collectively called a "LIAS" (a Livelihoods Impact Analysis Spreadsheet). This guide refers to the two most commonly used tools: the integrated spreadsheet (called "the LIAS" throughout this document), and the Dashboard. The guide will focus on the Dashboard as it is the most simplified tool.

Integrated spreadsheet (or the LIAS):

For analysis of multiple livelihood zones, up to 12 zones. The LIAS usually groups BSSs by similar types of livelihood (for example, agropastoralism, pastoralism, etc). The LIAS is an Excel spreadsheet comprising several worksheets, into which users enter problem specification data. The LIAS is linked to the baseline data (BSS) of each livelihood zone.

Dashboard:

A simplified LIAS designed to be more user-friendly than the two spreadsheets detailed above. It is most suitable for carrying out the OA for one livelihood zone at a time. The Dashboard is also an Excel spreadsheet but with the following simplifying characteristics:

- **fewer tabs, and data is entered on just one sheet**
- **step-by-step instructions integrated throughout, and guidance on how to specify a problem for five common types of shocks (drought, flood, cyclone, conflict, food price and increase)**
- **accompanied by a detailed manual**
- **clearer identification of key parameters**
- **includes a step to enter the cost and benefit of a project intervention in order to model its final outcome on households' total income.**

For these reasons the Dashboard is recommended for those less experwienced with HEA and is the tool on which this guide is based. Because the LIAS can be used for multiple livelihood zones (and multiple districts within a livelihood zone), a national Disaster Risk Financing analysis will require the use of a LIAS to model the impact of forecasted hazards on a national scale. These situations demand an expert HEA practitioner to run the OA (the principles of the application to risk financing can be transposed to any of the HEA OA tools).

15 *https://www.heacod.org/en-gb/Published%20Reports/SRAF%20Guidance.pdf.*

Getting started

This guide assumes that an HEA Baseline is already in place for the area(s) to be included within the disaster risk financing systems; the Baseline is a pre-requisite for the steps detailed below. (Details of the Baseline and its process can be found in Annex 2). For detailed livelihood zone maps, refer to the FEWS NET website.[16] Therefore, before beginning you will need to take the following steps:

- Find out whether an HEA Baseline exists for the area for which you wish to design the system. The HEA website will help you identify the livelihood zones that have baselines[17] or you can contact FEG. Where a Baseline already exists, you may need to collect some additional information from communities; this will be highlighted throughout the document.
- Where no Baseline exists, you should consider whether it would be appropriate to commission one. An HEA Baseline must be undertaken by a trained and experienced HEA practitioner.[18] It is recommended to add some questions to the standard baseline questionnaires in order to facilitate the DRF process; these will be highlighted throughout the document.

ASSUMING THAT THE HEA BASELINE EXISTS, THE STEPS COVERED IN THIS GUIDE ARE:

1. **Identifying event severity scenarios** – using the risk financing model or forecast data to identify a set of mild, moderate and severe events for a specific hazard and generate the problem specifications from which the OA will be generated.
2. **Running the indexed scenario analyses** – using the Dashboard to run three OAs for the three different severity events identified in Step 1.[19]
3. **Extracting the results for risk financing** – identifying the data that needs to be extracted and summarised from the Dashboard outputs for use in the disaster risk financing system.
4. **Verifying the results** – using historical data and community consultation and participation to verify the results and adjust accordingly.
5. **Scaling the results into the DRF system** – applying the results to impact modelling, contingency planning and systems financial analysis.

The time needed to complete this exercise will vary depending on how in-depth an approach is taken to the data investigation and analysis for designing the scenarios and generating the problem specifications. Analysis based on secondary data could take a few weeks; more in-depth community investigations may take a month or more, depending on the scale of the areas covered.

Once the data is collected, running the OA on the Dashboard should only take a few hours, after which synthesising the results for application to the impact model and contingency planning might take a further few days.

16 *Livelihood zone maps illustrate the country by livelihood zone; http://fews.net/livelihoods.*
17 *https://www.heacod.org/en-gb/Pages/Home.aspx.*
18 *The cost is approximately £20,000 per livelihood zone. Contact FEG to initiate this process (http://foodeconomy.com/contact).*
19 *The cost of getting someone to help complete Steps 1 and 2 is likely to be £10–15k.*

Step 1: Identifying event severity scenarios

The first step requires the identification of the different hazard scenarios. In risk financing these will be generated by the hazard triggering model being used. For example, in the case of an agricultural risk model, the projected impact on crop production will be driven by the rainfall and crop impact calculations for the area under analysis, for three hazard scenarios: mild, moderate and severe. These three scenarios should be defined by the model output based on return periods of the magnitude. Table 1 below shows a simplified example of this.

TABLE 1 HAZARD/SHOCK SCENARIOS

SEVERITY OF MODELLED EVENT (DROUGHT)	MODEL HAZARD RETURN PERIOD	SEASONAL RAINFALL	DROUGHT LEVEL	LIKELY CROP LOSS	ANALOGOUS YEAR
● MILD	1 in 3 years	-25%	0.6-0.8	30%	2014
● MODERATE	1 in 6 years	-40%	0.4-0.6	50%	2006
● SEVERE	1 in 10 years	-90%	0.0-0.4	90%	2016

Creating the scenarios for the OA, based on the hazard model used in the DRF system, is key to linking the impact outcome with the modelled hazard outcome. Identifying the "analogous year" (when an event of that scale happened in the past) is also key, as looking at data from that year will help to form the problem specifications for the key parameters.

Key parameters and the problem specification

As detailed above, key parameters are households' most important sources of food and cash; they are identified through the baseline information and are automatically flagged in the OA tools.
The problem specification (PS) is "the translation of a hazard such as drought into economic consequences at the household level".[20] As part of the OA, a PS is developed for every key parameter. This means comparing the scenario year based on the model outputs to the reference normal year. For example, the model may depict 2017 as a non-hazard normal year and 2014 as a one in three-year event.

Once the three scenarios have been depicted from the impact model, they can be used to define the PS for each key parameter; the PSs are then entered into the Dashboard.

There are three main types of PS:

- **Quantity problem: where the impact on the production of the household is estimated**
- **Price problem (items sold): where the price of things that the household sells is impacted**
- **Price problem (item purchase): where the price of commodities that the household purchased is impacted.**

20 *HEA Practitioners' Guide.*

Some helpful hints for setting PSs:

- **the reference year % value is always 100%**
- **if the current year value is less than the reference year, the PS will always be less than 100%**
  Example: if crop production is 30% less than the reference year, the PS would be 70%; this means the current year production is 70% of the reference year
- **if the current year value is higher than the reference year, the PS will always be more than 100%**
  Example: if crop production is 30% more than the reference year, the PS would be 130%.

The table below provides an example of a simple PS for crops for the three severity droughts sections for Nigeria former NG-10 livelihood zone (North-central maize, sorghum and cotton).[21]

TABLE 2 QUANTITY PRODUCTION PROBLEM STATEMENT

Shading indicates the most important sources of food, income or expenditure.

KEY PARAMETER	PS (% OF REFERENCE YEAR VALUE)			ASSUMPTION
	MILD	MEDIUM	SEVERE	
MAIZE	70	50	10	Crop production will decrease with poor rains.
MILLET	70	50	10	Crop production will decrease with poor rains.
RICE	70	50	10	Crop production will decrease with poor rains.
SOYA BEANS	70	50	10	Crop production will decrease with poor rains.
SORGHUM	70	50	10	Crop production will decrease with poor rains.
GROUNDNUTS & SESAME	70	50	10	Crop production will decrease with poor rains.
COTTON	70	50	10	Crop production will decrease with poor rains.
CATTLE SALES	90	60	25	Livestock sales are incorporated into coping strategies; this PS represents the decrease in herd size compared to the reference year size. Herd size has decreased due to excess mortality caused by the poor rains.
GOAT SALES	90	60	25	Livestock sales are incorporated into coping strategies; this PS represents the decrease in herd size compared to the reference year size. Herd size has decreased due to excess mortality caused by the poor rains.
SHEEP SALES	90	60	25	Livestock sales are incorporated into coping strategies; this PS represents the decrease in herd size compared to the reference year size. Herd size has decreased due to excess mortality caused by the poor rains.
AGRICULTURE LABOUR	75	50	10	More labour becomes available when the rain fails, as people seek out labour opportunities; as overall quantity increases, there are fewer opportunities for each individual household.
CONSTRUCTION	90	80	70	More labour becomes available when the rain fails, as people seek out labour opportunities; as overall quantity increases, there are fewer opportunities for each individual household.
FETCHING WATER	90	80	70	More labour becomes available when the rain fails, as people seek out labour opportunities; as overall quantity increases, there are fewer opportunities for each individual household.
FIREWOOD SALES	90	80	70	There is a slight decrease in demand due to households collecting firewood themselves (as a result of their decreased income).
CREDIT/ISLG	100	100	100	
SELF-EMPLOYMENT	100	100	100	Self-employment is accounted for in the coping mechanisms.

21 *The livelihood zone map in Nigeria was updated in early 2019.*

TABLE 3 PRICE SOLD PROBLEM STATEMENT

Shading indicates the most important sources of food, income or expenditure.

KEY PARAMETER	PS (% OF REFERENCE YEAR VALUE) MILD	MEDIUM	SEVERE	ASSUMPTION
MAIZE	130	150	200	The price for crops increases when harvest is below normal.
MILLET	130	150	200	The price for crops increases when harvest is below normal.
RICE	130	150	200	The price for crops increases when harvest is below normal.
SOYA BEANS	130	150	200	The price for crops increases when harvest is below normal.
SORGHUM	130	150	200	The price for crops increases when harvest is below normal.
GROUNDNUTS & SESAME	130	150	200	The price for crops increases when harvest is below normal.
COTTON	100	100	100	The price for cash crops is dependent on conditions at the national/international level, and not at the livelihood zone level.
CATTLE SALES	70	50	10	The price for livestock decreases due to increase supply (as households sell livestock as a coping mechanism) and poor body condition.
GOAT SALES	70	50	10	The price for livestock decreases due to increase supply (as households sell livestock as a coping mechanism) and poor body condition.
SHEEP SALES	70	50	10	The price for livestock decreases due to increase supply (as households sell livestock as a coping mechanism) and poor body condition.
AGRICULTURE LABOUR	90	50	10	The price for agriculture labour (wage rate) decreases due to over-supply of labour.
CONSTRUCTION	90	80	50	The price for construction labour (wage rate) decreases due to over-supply of labour.
FETCHING WATER	90	80	50	The price for fetching water (wage rate) decreases due to over-supply of labour.
FIREWOOD SALES	90	80	75	There is a slight decrease in the price collected from firewood sales, due to a small decrease in demand (due to households collecting firewood themselves (as a result of their decreased income).
SELF-EMPLOYMENT	90	80	75	There is a slight decrease in income generated from self-employment due to decrease in demand (linked to households decreased income and increase in collection of goods)

TABLE 4 PRICE PURCHASE PROBLEM STATEMENT

Shading indicates the most important sources of food, income or expenditure.

KEY PARAMETER	PS (% OF REFERENCE YEAR VALUE) MILD	MEDIUM	SEVERE	ASSUMPTION
MAIZE	130	150	200	Prices for staple foods increase due to reduced supply linked to below normal harvest.
FERTILISER	90	80	70	Price for fertiliser decrease slightly due to decreased demand linked to poor agriculture production.
LIVESTOCK DRUGS	110	130	150	Price for drugs increases as demand increases due to poor animal health.

How to collect data for the problem specification (impact scenarios)

The information to calculate the PS for each severity scenario can be sourced through two main channels: historical data and real-time data. Local knowledge should also be considered.

Historical data and local knowledge

Recorded historical data from an analogous year can help to define many of the PSs, such as crop yields and prices. However, more localised information may be more useful. Therefore, when designing the baseline data collection tools, additional questions on past shocks can be included. This can include asking about the coping mechanisms used by different wealth groups during different levels of shocks (and the months those coping mechanisms are used), and the impacts those events had on the household economy.

Note that if the Baseline has already been conducted, an additional survey or investigation of communities in the livelihood zone may be needed to understand the impact of different events on the key parameters, as well as the various coping mechanisms people employ.

Communities can be consulted to complete the data from the analogous year. Asking people about their memories of the period can be very useful. It might not necessarily result in perfect data, but techniques in gaining historical hazard data have been developed that can be effective.

Real-time data

Collecting information in, or just after, real hazard events can provide more recent information to feed into the scenario PSs. Therefore, to ensure continuous improvement, a robust monitoring system should be established that can allow the information to feed back into improvements in the modelling of impact on households.

It should be noted that all data sources will have a degree of error, however triangulating and considering as many information sources as possible will help generate the best estimation to drive the OA.

TABLE 5 SOURCES OF DATA TO PRODUCE PROBLEM STATEMENTS

SECONDARY DATA SOURCES	National and local government monitoring systems - reports from OCHA, FAO, WFP, UNHCR, FEWS NET, NGOs, ACAPS, media, etc. This data can be real-time or historical.
HAZARD HISTORIES INVESTIGATION	Conducting conversations and surveys with communities to understand the impact of past events on the key parameters.
EXPERT/MODELLED OPINION	Ask an expert or scientist to make a calculation of the impact for the problem statement based on a formula, method or model.

This additional information is also important in the contingency planning and the identification of appropriate early response interventions. For more details on calculating the problem specification for varying key parameters, see the ***HEA Practitioners' Guide*** (page 144).

Step 2: Running the indexed Outcome Analyses

Utilising the Dashboard

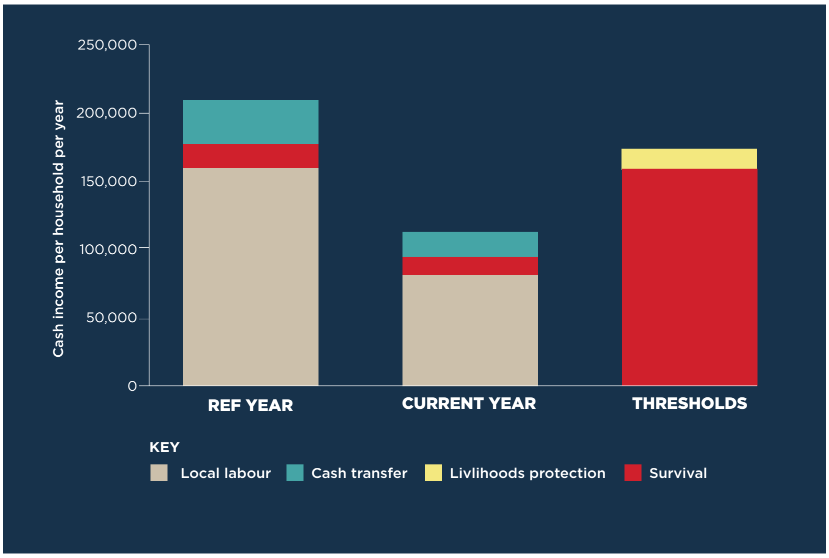
Once you have developed three sets of problem specifications (one for each scenario: mild, medium, severe) you can run the results through the Dashboard (or LIAS) one at a time to get your scenario impact results.

Note that existing LIASs and the Dashboard may be used to carry out the OA, so long as they have been set up correctly by an experienced HEA practitioner, and there is agreement with the commissioning party on the use.[22]

The Dashboard, set-up by FEG, currently contains data from many of the existing Baselines.

Each of the OA tools presents the results per wealth group in two sets of graphs: total income graphs and seasonal graphs. Figure 7 shows the total income graph for a wealth group. The graphs provide a detailed analysis of changes in access to food and income between the reference year and the scenario (calculated using the PS). In this example, we see that, following the shock, households' total income in the current year ("current year") is much lower than in the baseline year ("ref year"): the income they earn from casual labour, represented by beige, has significantly decreased because of the shock. Their total income is now well below the survival and livelihoods protection thresholds, represented by the red and yellow colours in the third bar.

FIGURE 7 TOTAL INCOME GRAPH



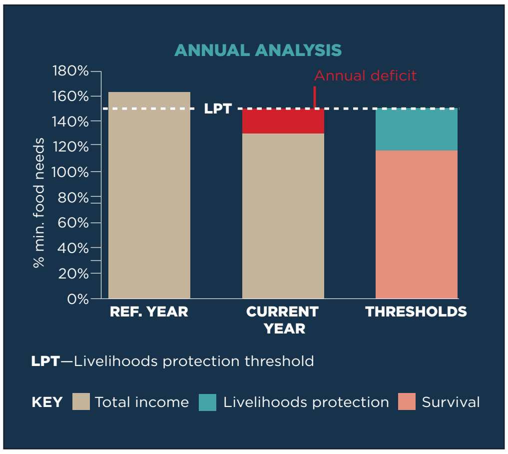
- **The total income (food plus cash) graphs show the end result of how the shock has impacted each food and income source.**
- **The seasonal graphs show total income per month, and the month deficits that are likely to occur.**

22 *If there is no LIAS or Dashboard for the targeted area, contact FEG (or check the HEA website) to verify if baseline information exists, and discuss next steps to setting up a LIAS or Dashboard or to carrying out HEA baselines.*

FIGURE 8a ANNUAL ANALYSIS

FIGURE 8b SEASONAL ANALYSIS

TOTAL INCOME (FOOD + CASH) - District: Hinalto Wejirat - Livelihood zone: RVL Household type: VP



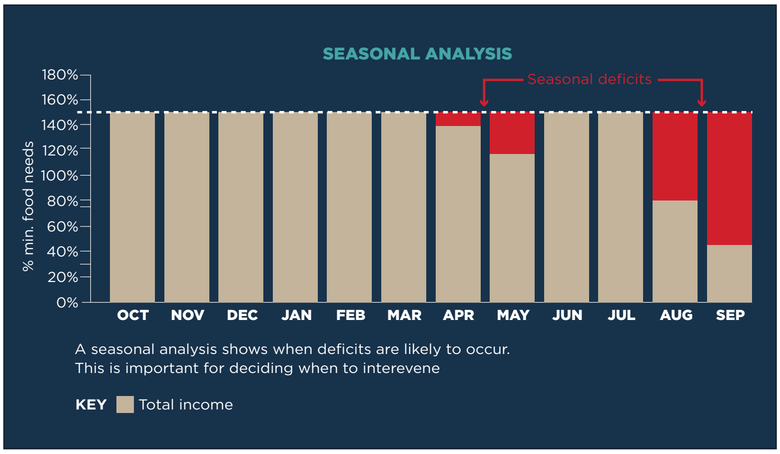


Figure 8a shows total income for a full year, and Figure 8b shows income by month. In Figure 8a, the first bar shows total income in the reference, or baseline, year: households are above both thresholds which are depicted in pink (survival) and blue (livelihoods protection). In the current year (second bar), households are below the livelihoods protection threshold but above the survival cut-off. Figure 8b shows households access to food and income for each month throughout the year. The red areas indicate when households will face a deficit (in this case, in April, May, August and September). This information is critical for triggering action and contingency planning.

As detailed in previous sections, the Dashboard is the most simplified tool for running an OA. There are ten main steps that must be completed in the Dashboard to run the OA. All are detailed in the Dashboard Manual.[23]

This section will describe in detail Steps 7-9, which are those for entering the PS.

As described above, the PS must be entered for each key parameter (KP). This is entered on the “data entry” sheet of the Dashboard, in **three key steps**:

7 **Set production/access to food and cash income**
(the Quantity Problem)

8 **Set the prices obtained for items sold**
(the Price Problem)

9 **Set the prices paid for items purchased**
(the Price Problem)

23 *https://www.heacod.org/en-gb/Published%20Reports/HEA%20Dashboard%20Manual.pdf.*

The following details on entering KP data are taken from the Dashboard Manual:

The Dashboard has the following features:

- **It lists the variables for which a problem should be specified - the key parameters (those listed under Step 7, below)**
- **Within the list of key parameters, it highlights the most important (highlighted in orange below).**

FIGURE 9 DASHBOARD SHOT 1

STEP 1: Select Area for Analysis

Step 1a: Select Country

Nigeria

Step 1b: Select Area within Country (LIAS)

Parts of Zamfara, Jigawa & Katsina States

This LIAS was commissioned by Save the Children (2014)

Step 1c: Select Region/Province (within LIAS)

All

Step 1d: Select District (within Region/Province)

All

Step 1e: Select Livelihood Zones (LZs)

LZ	1=Include	Popn (2012)	Ref.Season
CGC	1	1,198,227	Sep11-Aug12
HVM		1,228,609	Sep10-Aug11
MAS		263,054	Sep09-Aug10
		0	

STEP 7: Set Production/Access to
Important Types of Food and Cash Income
orange shading = most important
Maize
Millet:
Rice
Soya Beans
Sorghum:
Groundnuts & Sesame
Cotton
cattle sales
goat sales
sheep sales
food aid
Ag.labour
Construction

1. Enter baseline data into the reference year column "Ref. Year Quantity" (shaded in green in the diagram below), and current year data into the current year column "Current Quantity" (shaded in the left yellow in the column below). This will automatically calculate the PS in the purple/blue column. This option is preferable when there is monitoring (current year) data available.

FIGURE 10 DASHBOARD SHOT 2

STEP 7: Set Production/Access to Food and Cash Income (the Quantity Problem)

Important Types of Food and Cash Income	Guidance	Example Problem (%Ref)	7a: Enter Current Quantity (if shaded)	7b: Enter Ref.Year Quantity Year-1 Sep11-Aug12	Year-2	Year-3	7c: Enter Unit (e.g. MT)	Problem specification calc.	revised
orange shading = most important									
Maize	◉ Crop production will decline when	50%	25050	50100				50%	
Millet:	○ the rains fail.	50%						100% ◄	
Rice	○ .	50%						100% ◄	
Soya Beans	○ Some crops are more drought	50%						100% ◄	
Sorghum:	○ tolerant than others (e.g. sorghum	50%	200000	681400				29%	50%

2. Enter an estimated PS when there is no monitoring data. The estimated problem (%) is entered into the "revised" column (yellow), on the far right.

FIGURE 11 DASHBOARD SHOT 3

STEP 7: Set Production/Access to Food and Cash Income (the Quantity Problem)

Important Types of Food and Cash Income	Guidance	Example Problem (%Ref)	7a: Enter Current Quantity (if shaded)	7b: Enter Ref.Year Quantity Year-1 Sep11-Aug12	Year-2	Year-3	7c: Enter Unit (e.g. MT)	Problem specification calc.	revised
orange shading = most important									
Maize	◉ Crop production will decline when	50%						100% ◄	50%
Millet:	○ the rains fail.	50%						100% ◄	50%
Rice	○ .	50%						100% ◄	50%

The far-right column may also be used to override a PS calculated from the monitoring data, if the result seems unlikely and requires adjustment. See the example using sorghum in Figure 10 where the user revised the PS from 29% to 50%. Note that any number entered in this far-right column replaces the calculated data in the purple-shaded column. For further details, please refer to the Dashboard Manual.

Interpreting the OA results

For each scenario that is run using the OA, you will be provided with the outcome in cash (in local currency) and food values (cheapest locally-consumed cereal) for each wealth group. The outcome is measured against the two thresholds, and any projected gap will be quantified.

The OA will tell you (displayed in tables and graphs):

- **WHO – who will be affected**
- **WHERE – their location by livelihood zone or administrative zone, depending on how the analysis is run**
- **WHAT IS REQUIRED – how much is needed to meet survival needs and protect livelihoods, in cash and kcal**
- **FOR HOW LONG – the duration of the projected deficit (by months).**

The results tables

The first table (on page R ("Results") of the Dashboard) will show the total number of people and households projected to face a survival deficit, and how much cash or food is required to fill the gaps. In the example below (Figure 12) we can see that, under the moderate drought condition, the poor and very poor wealth groups are expected to face a survival deficit (an estimated 31,065 poor households and 44,379 very poor households). Each very poor household would require 4,800 naira or 48kg of cereal to fill the deficit. The orange shading on the Dashboard indicates that the deficit equates to less than one month of food consumption.

FIGURE 12 SURVIVAL DEFICIT ANALYSIS

	Survival Deficit				
Orange shading indicates a deficit equivalent to <1 mo food consumption	Wealth Group				Total
	Very Poor	Poor	Middle	Better Off	
%population in wealth group	26%	26%	26%	22%	
No. people facing a deficit	310,651	310,651	0	0	621,303
Household size	7.0	10.0			8.2
No. Households facing a deficit	44,379	31,065	0	0	75,444
If the gap is filled with cash:					
Cash required per household ('000 Naira)	4.8	8.2	0.0	0.0	6.2
Total cash requirement ('000 Naira)	212,606	254,089	0	0	466,695
If the gap is filled with food (cereal):					
Cereal required per household (kg)	48	82	0	0	62
Total cereal requirement (metric tonnes)	2,133	2,549	0	0	4,681

The second table (Figure 13) shows the same information but in terms of the total deficit, that is the survival plus livelihoods protection deficit. We can see that when the livelihoods protection deficit is included, the middle households face a deficit, in addition to the poor and very poor households. In this Nigeria example, 621,303 households (very poor and poor) will face a livelihoods protection deficit, and an average 725 kg of food or 72,200 naira is needed per household to fill the gap.

FIGURE 13 TOTAL (SURVIVAL + LIVELIHOODS PROTECTION) DEFICIT ANALYSIS

Total Deficit				
Wealth Group				Total
Very Poor	Poor	Middle	Better Off	
26%	26%	26%	22%	
310,651	310,651	0	0	621,303
7.0	10.0			8.2
44,379	31,065	0	0	75,444
58.0	92.6	0.0	0.0	72.2
2,574,619	2,875,860	0	0	5,450,479
582	929	0	0	725
25,824	28,846	0	0	54,670

The results graphs

The graphs illustrate the impact the hazard has had on each wealth group's food, income and expenditure, as well as the end result which includes households' non-harmful coping mechanisms.

The graphs display:

- **total income (food plus cash) in the format of the percentage of food energy needs**
- **total income (food plus cash) expressed in cash terms**
- **food sources as the percentage of food energy needs**
- **income sources as the percentage of baseline income and expenditure as the percentage of the baseline expenditure.**

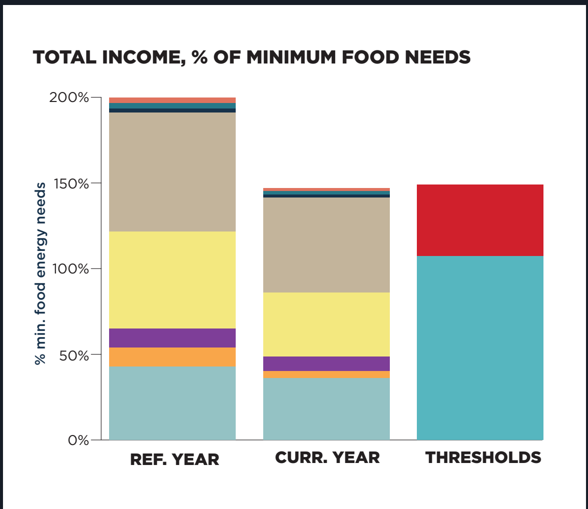
To interpret the results, it is helpful to focus on the most significant changes, i.e. the sections of the bars that show considerable change. The graphs below display the change in sources of food and income for the very poorest households in the cotton, sesame and maize (CSM)[24] zone in Nigeria based on the three drought scenarios. These are shown as both the income as a % of total food needs and as total income. For additional details on how to interpret the OA results, please consider completing the online OA refresher course.[25]

The following graphs show the results for Nigeria CSM for very poor households for the three drought scenarios defined in Step 2.

You will be able to use the following information in your risk financing design for modelling, contingency planning and financing prepositioning: the sources of food, the income and expenditure that have been the most impacted; and the number of households that will face a deficit, its timing and duration. The model shows that after a mild drought, very poor households would not face any deficits; after a moderate drought, the very poor would likely face a livelihood protection deficit; in a severe drought event, the very poor would face large deficits (i.e. significant income and food gaps) and, as such, would be below the livelihood protection and survival thresholds.

24 *Zone based on the 2014 livelihood zone map.*
25 *https://www.heacod.org/en-gb/Pages/OnlineModulesHEA.aspx.*

FIGURE 14 **MILD DROUGHT OA RESULTS**



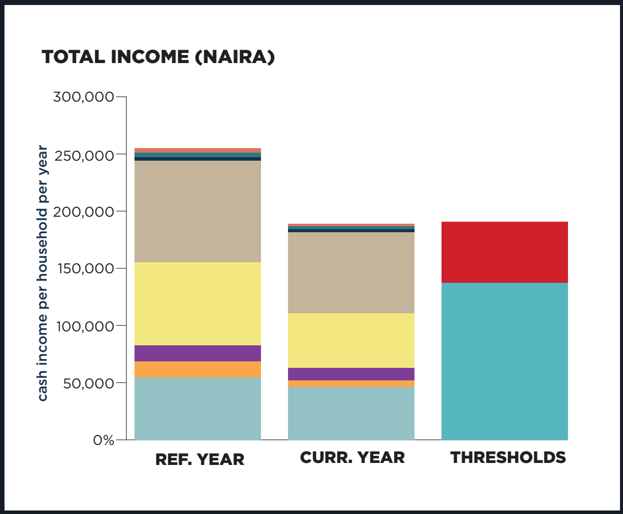
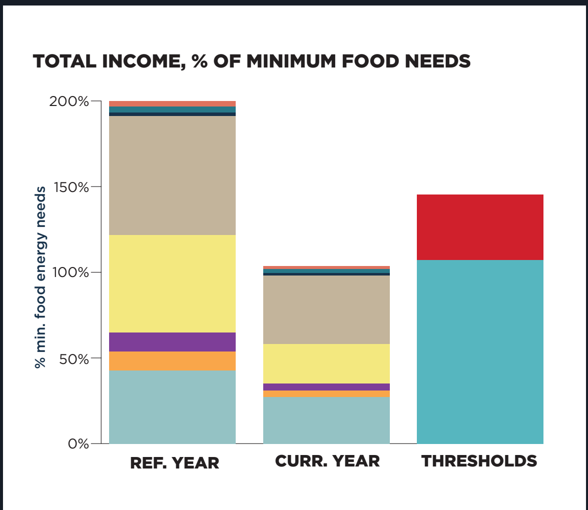


FIGURE 15 **MODERATE DROUGHT OA RESULTS**



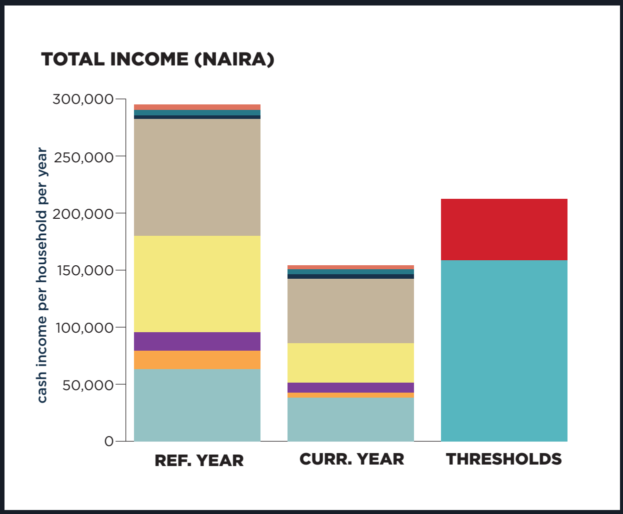
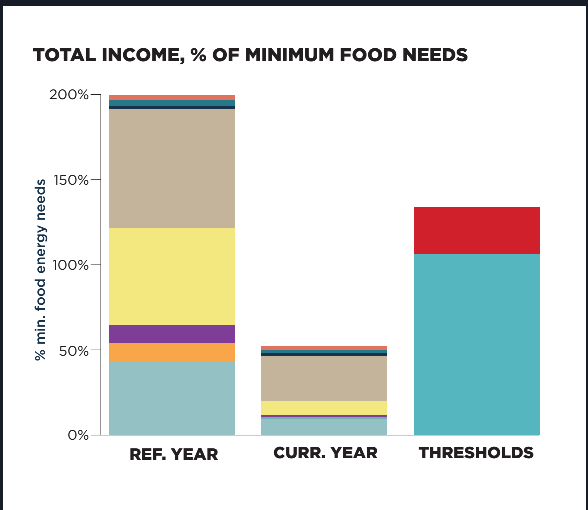
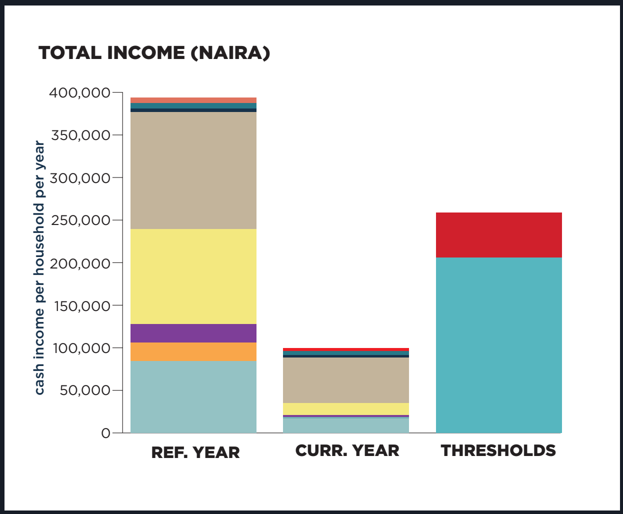


FIGURE 16 **SEVERE DROUGHT OA RESULTS**





KEY

Wild foods/other; Payment in kind; Gifts/remittances; Self-employment; Local labour; Livestock sales; Crop sales; Crops; Livelihoods protection threshold; Survival threshold

Step 3: Extracting the results for risk financing

Once you have run the OA for each of your hazard scenarios you should be able to extract the data from the Dashboard into the following table for use in your risk financing system (number of households (HH), and projected total (annual) deficit in cash value, in this case Nigeria naira). These tables are referred to as the "transition tables". You should also extract the calendar result, showing when these deficits occur over weeks/months.

TABLE 6 TRANSITION TABLE

WEALTH GROUP THRESHOLD DEFICITS		VERY POOR SURVIVAL	 LIVELIHOOD	POOR SURVIVAL	 LIVELIHOOD	MIDDLE SURVIVAL	 LIVELIHOOD	BETTER OFF SURVIVAL	 LIVELIHOOD
MILD	Cash value	0	1,800	0	0	0	0	0	0
	HH	0	44,379	0	0	0	0	0	0
MODERATE	Cash value	4,800	5,800	8,200	9,260	0	0	0	0
	HH	44,379	44,379	31,065	31,065	0	0	0	0
SEVERE	Cash value	105,900	158,700	168,000	252,100	0	119,300	0	755,900
	HH	44,379	44,379	31,065	31,065	0	22,189	0	13,314

TABLE 7 TRANSITION TABLE

SEVERITY EVENT	MODEL HAZARD RETURN PERIOD	SEASONAL RAINFALL	DROUGHT LEVEL	LIKELY CROP LOSS	ANALOGOUS YEAR	LIVELIHOOD PROTECTION DEFICIT	TOTAL HH (ALL WG) IN NEED (NAIRA, PER HH)	TOTAL HH (ALL WG) INCOME & FOOD GAP
MILD	1 in 3 years	-25%	0.6 - 0.8	30%	2014	1,800	44,379	79,882,200 Naira OR $220,050
MODERATE	1 in 6 years	-40%	0.4 - 0.6	50%	2006	15,060	75,444	113,618,6640 Naira OR $3,129,844
SEVERE	1 in 10 years	-90%	0.0 - 0.4	90%	2016	1,286,000	110,947	142,677,842,000 Naira OR $393,040,719

You can then extrapolate these results to create results for any modelled eventuality.

FIGURE 17

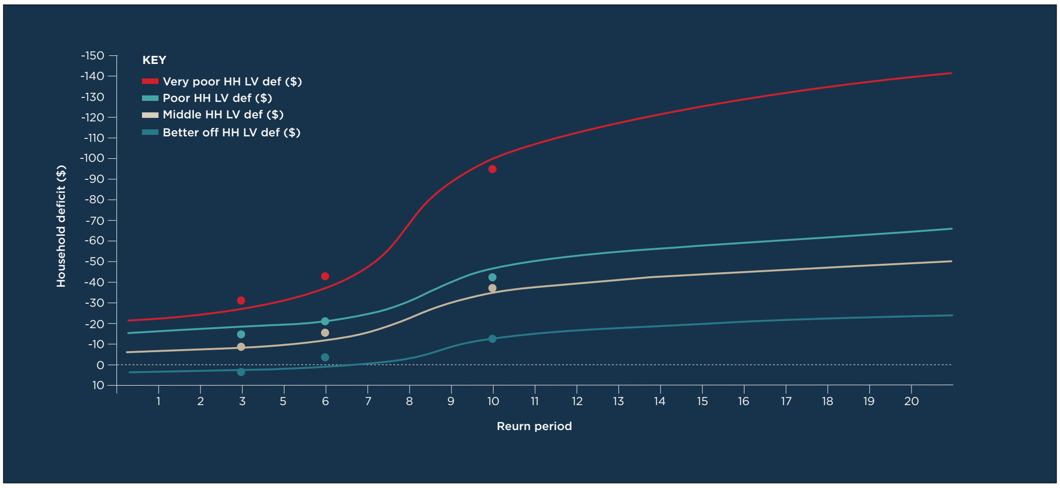
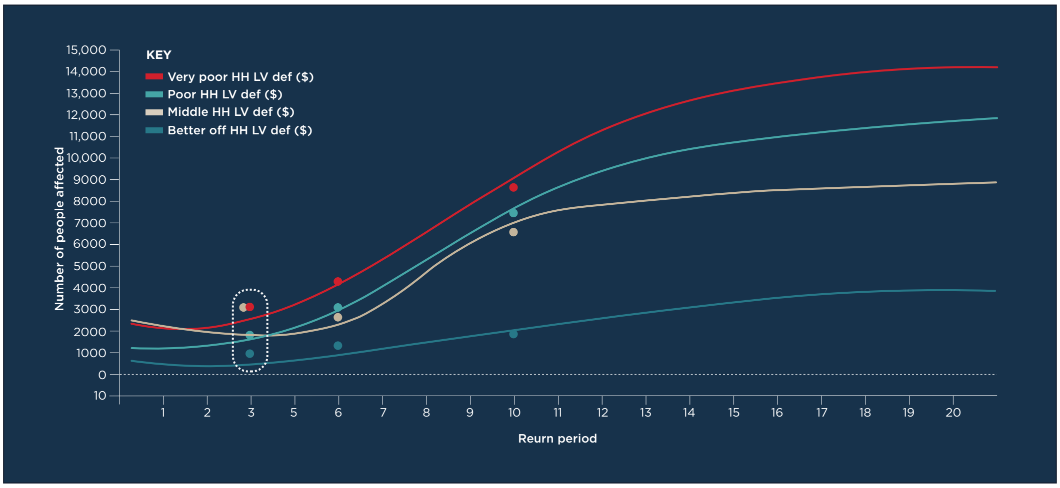


FIGURE 18



The graphs plot the scenarios run from the model on the x axis, and the number of people affected on the y axis as provided by the Outcome Analysis. For example, in the white circle, the OA of a drought of a return period of three years provided the number of people for each wealth group likely to be impacted. The three scenarios provide our three reference points across all potential hazard events.[26] We extrapolate from them so whatever return period the model forecasts, an impact result can be generated. Having these scenarios allows for contingency planning, budgeting and financial proposition – all to be completed in normal times so as to be better prepared to respond quickly in the event of a shock. However, extrapolating data between the scenarios brings in many assumptions and sources of error; creating more scenarios and identifying more PSs are unlikely to relieve this. This is also a key reason why a rapid verification system is needed (see Step 5).

26 *Hazards follow a normal distribution with large events happening rarely and small events often.*

Step 4: Verifying the results

Making sure that the process set out above is carried out in consultation with communities at risk will always give the most accurate – and the most accountable – systems. OA results should be shared with at-risk communities, verified, adjusted and, where possible, agreed or at least made available for communities to review and critique. Over the years, community-based Disaster Risk Reduction work has developed many approaches that can help ensure that processes like that outlined in this guide are carried out in participatory ways. This can include hazard transect walks and mapping; identifying the impacts of historical events; community consultation meetings; and ensuring the most vulnerable are heard. This is especially important when developing the PS as older people tend to have the longest timeline of information on past events and their impacts, information that can be critical to this kind of exercise.

A list of useful community-based DRR participatory guides can be found here:
https://www.preventionweb.net/files/48286_48286resource1compendiumoftoolsguid.pdf.

Mount Kenya region, Kenya. Picture taken for the Two Degrees Up project, looking at the impact of climate change on agriculture..

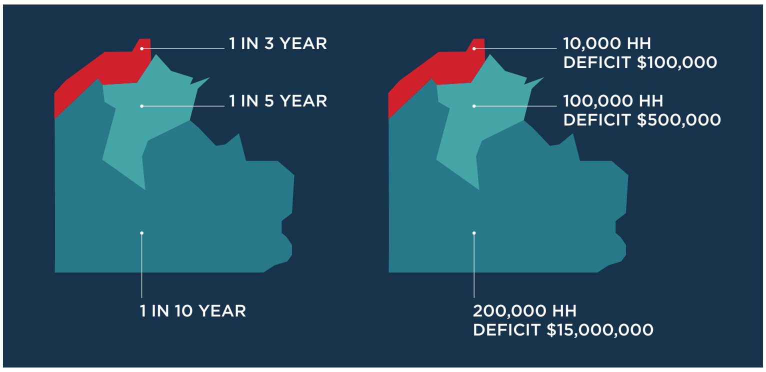
Step 5: Scaling the results into the Disaster Risk Financing system

The Dashboard results and completed transition tables for each livelihood or administration zone can be combined into larger geographical areas.

As previously mentioned, the LIAS is more efficient than the Dashboard for running an Outcome Analysis for multiple livelihood zones and districts within zones. Different PS data can be entered for different zones and results generated for each specific zone. However, the LIAS is a complex tool that demands significant experience to be used effectively; it is therefore important that an HEA expert oversees or leads any OA exercise of this kind.

Once the impact data is attached to the hazard models for each area, the model can be run and tested. If the hazard model is run on historical years, the areas impacted, and any projected household deficits for that event, can be assessed for accuracy. Figure 19 below demonstrates a model run for drought in 2015.

FIGURE 19 HAZARD MODEL EXAMPLE



Impact modelling

You can use the HEA scenario-based results to provide an impact model driven by the hazard or risk model. For example, if you are using a drought model with a one in six-year drought event forecast, the OA will generate any likely deficit that households will face, including the number of people affected. The projected HEA deficits can be the system's trigger as they provide a clear indication of risk across the livelihood zones: They detail the magnitude of the household income gap against the two thresholds; they also highlight the geographic areas likely to be most affected and the timing of the deficit.

The triggers can be set at a local livelihood zone level, or a cumulative trigger can be set at a national or provincial level based on the results of modelled outcomes across several livelihood zones.
The HEA OA results may be integrated into a model or kept as a separate data set related to the model, depending on the financial triggering requirements.

It is worth noting that OA results are not the response costs but the projected impacts of the hazard on households. The results indicate the amount (cash or kg) that would be needed to fill the projected gap at household level, but not other types of interventions, operational costs, etc.

The financial sums required to avoid the projected household deficits should come from the contingency planning process, which assesses how best to cover the projected household needs (and enable those households to cope). This can include a variety of interventions (not just food or cash distributions) and must also consider the operational expenses of the actions identified.

Example

TABLE 8 TRIGGERING TABLE

	MODEL RESULTS	OA RESULTS		FINANCIAL MECHANISM TRIGGERED
		NO. HH	PROJECTED TOTAL DEFICIT (CASH)	
AREA A	**1 in 8 year**	**30,000 poor households at risk**	**Total household gap of $500,000**	Contingency fund
AREA B	**1 in 8 year**	**25,000 poor households at risk**	**Total household gap of $700,000**	Insurance

In the example set out in Table 8, were we to prime the system to trigger funding once 27,000+ households were impacted, the system would trigger a fund payment for Area A (30,000 households at risk). Alternatively, we might prime the system to trigger an insurance policy payment once a $600,000+ deficit had been reached by poor households. In this case, Area B would trigger an insurance payment.

How the triggering is set from the hazard model through to the impact HEA OA model is down to individual systems.

Costing a contingency plan for early action or response

The HEA OA for each livelihood zone or district provides an accountable way to begin to build contingency plans for different events.

A contingency planning process is not fully outlined in this guide, but supplementary guidance on contingency planning is in development.

Data from the Baseline and from the OA (specifically the seasonal or hazard calendars) provides information on the various livelihoods, seasonal activities and needs over the months or early response period. This can be used to identify appropriate months for early or timely intervention.

The HEA projected monthly deficits identify the point at which households are likely not to be able to meet their food or livelihoods needs, thereby indicating when action needs to be taken if losses are to be avoided.

CONTINGENCY PLANNING FRAMEWORK

1

Early Warning Timeframe Calendar (months, weeks, days) – what is the potential length of action timeframe for the hazards?

- Potential duration and timing of the hazard and its early warning period.

2

What do people at risk do to cope or protect themselves across the timeframe?

- The HEA baseline provides information on the different wealth groups' most common coping strategies. Additional information can be collected to identify WHEN those coping strategies are normally applied.

3

Which people are most at risk and when will they need support to avoid the forecasted impacts of the crisis, or to be protected from it?

- The HEA OA tells us the wealth groups most at risk of the forecasted crisis (those likely to face deficits), and the timing of the projected deficits.

4

What can we do to support people; what are the objectives of the response?

- The HEA OA tells us the type of deficit that households will likely face, and the amount of support that will be needed to fill the projected deficits (in cash and kg). This helps us to know if our objective should be about protecting households from extreme hunger or protecting livelihoods (or both).
- It also tells us what food, income and expenditure sources will be primarily impacted, which can inform response options.

5

What are the optimum windows of opportunity to reduce risk?

- The HEA OA tells us when the deficits are likely to occur. This is critical to mapping out the time available (in months) to act early to reduce households' risk.

The scenario-based OA will provide the data and evidence to predict the likely nature, severity and timing of the household impact. This allows action to be designed that seeks to enable households to cope more effectively with the shock – to protect their livelihoods and/or their food consumption. The total household deficit – plus additional response action and operational costs – is then used to build the contingency planning budget. This should be done for each of the three scenarios.

Table 9 below shows a simplified version of an early-action contingency planning tool. Using a calendar or crisis timeline, information can be added on the actions people at risk take to cope with the shock (depending on the coping capacity available at the time), as can HEA data on the projected timing of the deficits. The actions planned by the responders can be added to demonstrate whether the early or timely action will be appropriate for the predicted impacts and coping activities (highlighted in pink below). Additional actions outside of the demonstrated household needs can also be included. Finally, implementation activities and costs can be included across the calendar for preparedness planning. The total cost of the response can then be completed.

TABLE 9 CONTINGENCY PLANNING TEMPLATE

ASSESSMENT AND PLANNING	DATA CATEGORY	MONTHS OR EARLY WARNING TIMEFRAME	BUDGET
RISKS AND NEEDS	Seasonal/crisis calendar	What's happening and when	
	Hazard calendar	What's happening and when	
	Coping mechanisms over time	What's happening, where and who	
	Household impact calendar (based on PS)	What's happening, where and who	
	Household OA deficits per calendar month	When, where and who	
CONTINGENCY PLANNING FOR EARLY ACTION AND RESPONSE			
EARLY OR TIMELY ACTION	Household early response response activities (e.g. cash transfers)	When, where and who	££
	Additional responses outside of the households	When, where and who	££
	Operational implementation & indirect costs	When, where and who	££
			TOTAL RESPONSE COST

FIGURE 17 DROUGHT CONTINGENCY PLANNING EXAMPLE TEMPLATE

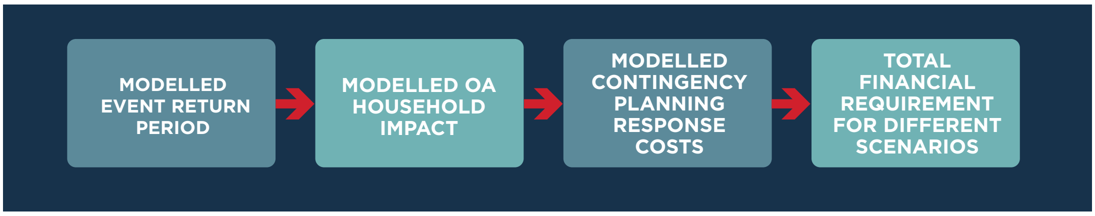
Seasonal Calendar													
								Rains					
Ground Nut	Harvest					Planting			Growing			Harvest	
Maize						Planting		Growing		Harvest			
Millet and Sorgum							Planting	Growing		Harvest			
Rice	Harvest						Planting			Growing		Harvest	
Pasture	Poor	Poor	Very Poor	Very Poor	Poor - Imp	Improving	Good	Good	Good	Good	Declining	Poor Declining	
	January	February	March	April	May	June	July	August	September	October	November	December	
Coping mechnaisms													
Household Impacts													
Household deficits													
													Budget
Household response activities													
Additional response activities													
Implimentation and operational activities													
													Total response cost

This process calculates – as a total response cost – the response financing required for different severity events, and the financial sums the system needs to release to cover the risks of those who might be impacted.

The Start Network has developed an Excel-based crisis timeline and disaster risk financing contingency planning tool based on the example above, which it continues to iterate. To discuss this and/or the integration of the OA results, you can email *labs@startnetwork.org*.

Financial modelling with donors and financers

Using the calculated household deficits and the corresponding contingency planning budgets for the total response, you can run various scenarios based on historical events to assess potential outcomes and the response financing required for one or more livelihood zones or districts. This exercise can also be carried out with donors or financers (working with actuaries to understand what the likely and maximum amounts the system may have to pay out in any one year).



For example, historically, the worst hazard event may have caused a one in 18-year event in ten districts and a one in 25-year event in five districts. According to the model, it would have cost $40 million to implement a response to protect the population against this risk. By running a range of contingency planning scenarios based on the HEA OA, actuaries can allow donors and financial services providers to assess different levels of financial risk and liabilities ahead of designing financial instruments or allocating support. This is how an insurance company would price their insurance if using risk transfer.

Making the results live – rapid adjustment in response operations

Everything we just did may not be entirely accurate, but that's OK! All models, including the HEA OA, will be inaccurate to some degree. Combining the OA with a hazard model – whose forecasts also contain uncertainty and error – will inevitably mean a result that is less than 100% accurate, but that doesn't mean that the process and its impact are not useful.

The aim of the process is to support risk-based decisions made at speed; to facilitate the building of contingency plans; and to ensure the efficient release of funding. The OA results also allow a risk profile to be developed that enables different financing instruments to align with different severity risks, and for the data to be independent (i.e. not influenced by those who might seek to lose or gain). However, in order to ensure the correct response, systems need to be put in place to handle the inevitable divergence of the modelled forecast impact and the actual outcome.

Once a model has triggered, a system will need to be in place to rapidly verify its results and adjust them based on the more extensive live data that will become available as events unfold. A Rapid Verification Reassessment (RVA) allows for the hazard model to be quickly assessed against other models and data, and for a rapid sense check to take place on the ground to determine that OA results make sense.

An example of the how the picture might change could be that another hazard has impacted people earlier in the year and therefore their coping is not what it was modelled to be. In this case, the modelled OA would need a sensible adjustment.

As standard practice, an ongoing monitoring and adjustment system should be established by the system to allow for:

- **the adjustment of the contingency plan to an implementation plan, with a budget adjustment**
- **the adjustment of the finance to meet the implementation plan.**

How the financing is adjusted will be down to individual systems and financial instruments and how they manage basis risk operationally and financially.

Using HEA to verify other impact modelling

This guide describes the use of HEA OA in the building and development of risk financing and FBF systems. However, where systems are already established with their own vulnerability and impact methodologies, running an HEA OA as a comparator can be a useful exercise to support the existing modelling or to help improve and adjust it.

What's next?

The use of this guide and the methodology will be documented in risk financing and FBF systems over the coming two years. These case studies will sit as supplements to this guide. The learning from these pilots will also be fed back into the guidance note with an update expected in 2021.

FURTHER INFORMATION

For further advice on using this guide you can contact:

- Clare Harris - Technical Lead for Disaster Risk Financing, Start Network, *clare.harris@startprogrammes.org*
- Laura Swift - Livelihoods and Food Security Adviser, Save the Children *L.Swift@savethechildren.org.uk*

For specific requests on using or carrying out HEA assessments, please contact:

FEG Consulting – *http://foodeconomy.com/contact/*

ANNEX 1
Additional guidance materials

The following detailed guides contain additional details on the HEA Baseline OA and response analysis:

TABLE 9 HEA BASELINE OA AND RESPONSE ANALYSIS

DOCUMENT	DESCRIPTION	LINK
The Practitioners' Guide to the Household Economy Approach (available in French and English)	Detailed guidance on carrying out HEA assessments that serves as both a refresher guide for experienced practitioners, and a reference text to accompany formal training for new practitioners.	*https://www.heacod.org/en-gb/Published%20Reports/The-Practitioners-Guide-to-HEA.pdf*
The HEA Guide for Programme Planners and Policy-makers	A detailed overview of HEA and how it is implemented in the field and applied for different purposes.	*https://www.heacod.org/en-gb/Published%20Reports/HEA-Guide-for-Policy-Makers.pdf*
The HEA Dashboard Manual	Detailed guidance on how to use the Dashboard to carry out the simplified OA.	*https://www.heacod.org/en-gb/Published%20Reports/HEA%20Dashboard%20Manual.pdf*
The Situation and Response Analysis Framework (SRAF)	An overview of using HEA to develop detailed and appropriate contingency planning for timely response.	*https://www.heacod.org/en-gb/Published%20Reports/SRAF%20Guidance.pdf*

ANNEX 2
The HEA Baseline

The Baseline is broken into three main steps: livelihood zoning, wealth breakdown and quantifying livelihood strategies. A brief overview of each step is provided here; for detailed guidance please refer to the ***HEA Practitioners' Guide***.

Livelihood zoning

OVERVIEW: defining geographical areas where households share the same type of livelihood, such as cultivating specific kinds of crops.

HEA facilitates household economy analysis by grouping households into livelihood zones. The livelihood and geographical options available to households during normal years determine the types of shocks that may befall them and how they will cope. A livelihood zone is a geographical area within which people share broadly the same patterns of access to food and income, and have the same access to markets. The process of defining different livelihood zones relies heavily on key informants. Livelihood zones are important because geography (along with wealth) is one of the most important factors in determining how households access food and income.

As detailed in the ***HEA Guide for Programme Planners and Policy-makers***, the steps in livelihood zoning are usually:

- **a review of available rainfall, agroecological, soil, vegetation and agroeconomic maps**
- **an initial workshop (at either national or regional level) to obtain a preliminary map and zone descriptions, usually with technical staff from relevant line ministries (e.g. agriculture, livestock, meteorology, natural resources, fishing), NGOs, etc.**
- **consultations with key informants at a lower level (either regional or district), and possibly some village visits, to confirm the map and clarify any outstanding issues**
- **a return to the first level to agree any changes with partners and establish a consensus on the 'final' map; a livelihood zone map is always open to change as a result of more detailed fieldwork and updates, so period updates or confirmation is important, especially in complex emergencies.**

Detailed livelihood zone maps are available on FEWS NET's website.[27] If livelihood zoning has taken place for the country for which the HEA analyses will be conducted, implementers may map out their own livelihood zone. However, it is strongly recommended that such an exercise is carried out with the support of experienced practitioners from FEWS Net[28] or the FEG.

27 *http://fews.net/livelihoods.*
28 *FEWS Net is a leading famine early warning network (http://fews.net/).*

Wealth breakdown

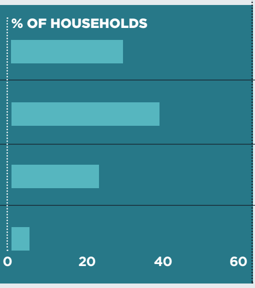
OVERVIEW: the grouping of households based on wealth and assets.

The wealth breakdown exercise identifies households' capacity to exploit the various food and cash income options available to them within their livelihood zone. Wealth breakdown information is gathered at community level through key informant interviews. Informants are asked to "break down" the community into different wealth groups by identifying the number of groups and their corresponding characteristics. The minimum information to be collected for this step is:

- **the proportion of households in each group**
- **the typical household size and its dynamics**
- **the assets owned and/or accessed by different wealth groups**
- **other social characteristics of each group.**

The information is then inserted into a Baseline Storage Spreadsheet (BSS).

TABLE 10 WEALTH BREAKDOWN RESULTS: VANILLA, CLOVE & COCONUT TREE LIVELIHOOD ZONE, SAVA, MADAGASCAR



	HOUSEHOLD SIZE	PERCENTAGE OF HOUSEHOLDS	LAND OWNED	LIVESTOCK
VERY POOR	5 - 7 (6)	30%	0 - 1 (0.5) Ha	1 - 3 chickens
POOR	5 - 7 (6)	40%	0.5 - 1.5 (1) Ha	4 - 8 chickens, 1 - 2 pigs
MIDDLE	5 - 7 (6)	25%	2 - 5 (3) Ha	10 - 15 chickens, 3 - 5 pigs
BETTER OFF	5 - 7 (6)	5%	3 - 7 (5) Ha	10 - 15 chickens, 5 - 10 pigs, oxen

Save the Children, Oct 2015

Quantification of livelihood strategies

OVERVIEW: summarises and quantifies annual food, cash and expenditure by wealth group.

This information is collected through focus group discussions with each wealth group at each interviewed community. Around six to ten households from each wealth group participate in each focus group discussion. The data is also inserted into the BSS.

Data collection

HEA baseline assessments are carried out through interviews at the district and community or village level, and then focus group discussions at the household level in eight to 12 villages. Prior to the data collection, enumerators must complete either face-to-face training or the online baseline training.[29]

TABLE 11 DATA COLLECTION METHODS[30]

Interviews with district level key informants	• to develop or refine livelihood zoning • to select villages for data collection (those deemed "typical") • as a courtesy: to inform them of the work to be done • some information on market systems and prices.
Interviews with community/ village leaders: eight to 12 villages to be assessed per livelihood zone	• to gather background information, including on recent or comment hazards and households' common responses • to develop a seasonal calendar • to carry out a wealth breakdown of the community • to select households from each wealth group to participate in the focus group discussions.
Focus group discussions (FGD) with representatives from each wealth group: one FGD per wealth group per village	• to gather information on households' access to food and income, and their expenditure. *This information is then converted to kcal and compared against each threshold. Each food source is calculated by converting each into calorific equivalents; these are expressed as a proportion of the minimum caloric needs of the household, taken to be an average of 2,100 kcals per person per day. The cash income obtained from different sources, and patterns of expenditure, is assessed and quantified, and converted into kcals.*

Utilising the HEA Baseline Storage Spreadsheet

The Baseline Storage Spreadsheet (BSS) houses all the information collected through the fieldwork. It is an Excel spreadsheet made up of several worksheets where data from the community interviews and wealth group discussions is entered and assessed. It performs several functions, including:

- **cross checks data to facilitate post-fieldwork analysis and ensure reliability of the data, for example:**
  - **calculates total food access**
  - **compares income and expenditure**
  - **cross checks casual labour payments**
- **totals food, income and expenditure for each wealth group**
- **generates graphics to show visual results of household's total income.**

29 *https://www.heacod.org/en-gb/Pages/OnlineModulesHEA.aspx.*
30 *Table adapted from the **HEA Guide for Programme Planners and Policy-makers**.*

Filipino rice farmers in Laguna
province incorporate rice straw,
a good and abundant source
of organic material, back in the field.

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