

# INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES' FORECAST-BASED ACTION BY THE DREF FINANCING THE FORECAST-BASED EARLY ACTION PROTOCOLS



## GUIDANCE NOTE

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## About this report

This report was written for the International Federation of Red Cross and Red Crescent Societies (IFRC) and the Centre for Disaster Protection (the Centre) by Georgina Bedenham and Colin Wilson of the UK Government Actuary's Department (GAD).

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## ● ACRONYMS

DREF	Disaster Relief Emergency Fund
EAP	Early Action Protocol
FbA by the DREF	Forecast-based Action by the DREF
GAD	Government Actuary's Department
IFRC	International Federation of Red Cross and Red Crescent Societies
IFFIm	International Finance Facility for Immunisation

## ● GLOSSARY

Binomial distribution	A binomial distribution is a distribution that models a scenario where an experiment is repeated a number of times and each time there are two possible outcomes—success or failure.
Captive	An insurance company that is owned and controlled by those that it insures. It insures the risk of its owners by charging and retaining a premium and then taking on the risks if a claim arises.
Copula	Copulas are statistical functions that are used to model the dependence between variables. They are used widely in finance and economics as a tool to support risk management.
EAP	An EAP is a formal plan that guides the timely and effective implementation of early action when a severe weather or climate forecast shows a high likelihood of critically impacting people in a target area. The EAP contains information on triggers (when to activate), early action (what to do) and funding allocation (with what resources). It describes the step-by-step process for the implementation of early action once a trigger is hit. EAPs address extreme events that occur, on average, every five years, and cover three types of costs: annual readiness costs, one-off pre-positioning costs, and early action costs (once a trigger is reached). Funding for this last set of costs is only released once the pre-agreed trigger is met.
Excess of loss	Excess of loss cover is a type of reinsurance whereby an insurer or reinsurer agrees to pay for losses above a pre-agreed specific limit, usually subject to an upper limit.
Insurance-linked securities	A type of financial instrument traded amongst investors and are a way for companies to transfer risk and raise funds. Their value is linked to insured loss events such as natural hazards. Investors take on the risk in return for investment returns. If the particular risk event occurs, the investor will lose their original invested funds and these funds will be used by the issuing company to cover their losses. Catastrophe bonds are a common type of insurance-linked security whereby a specific set of catastrophic and natural hazard risks are transferred to capital market investors from an issuing company.

## ● FOREWORD

The intensity and frequency of natural hazards is increasing, leaving behind an unprecedented and growing level of humanitarian need. In the past ten years (2010–2019), 2,850 disasters have been triggered by natural hazards, with the majority of these (83%) caused by climate- and weather-related extreme events, such as floods, storms and heatwaves<sup>1</sup>. These disasters have affected close to 1.8 billion people, out of whom 97% have been affected by extreme weather- and climate-related events.

Building on decades of experience in disaster preparedness and forecast-based action, the Red Cross and Red Crescent network has been pioneering and promoting the Forecast-based Financing (FbF) approach since 2014 to reduce the impacts of hazards on vulnerable communities, save lives and protect homes and livelihoods. By triggering humanitarian funding for pre-agreed early action based on risk analysis and forecasts, rather than waiting until after a disaster to respond, FbF is a faster, cheaper and more dignified way to provide humanitarian assistance. Yet many Red Cross and Red Crescent National Societies in countries most affected by natural hazards do not have the financial capacity to implement anticipatory humanitarian action. International financial support is therefore critical to help National Societies implement this approach.

IFRC launched the Forecast-based Action by the DREF in 2018 as a dedicated financial mechanism for anticipatory humanitarian action by National Societies. Other humanitarian agencies such as the START Network, World Food Programme (WFP), Food and Agriculture Organization (FAO) and UN Office for the Coordination of Humanitarian Affairs (OCHA) have also started to fund and develop similar concepts. Together, anticipatory approaches are now being implemented in over 60 countries, with the Red Cross Red Crescent network accounting for more than half of these.

With the increasing number of National Societies implementing FbF, and in line with IFRC's ambition to further scale up anticipatory humanitarian action, the value of each dollar needs to go further than before and we have therefore been exploring options to secure disaster risk financing options to meet our growing ambition. While we need to embrace the expertise from the financial sector in this endeavour, as humanitarians we also need to ensure a human-impact driven lens to risk financing by identifying the financial and operational needs from the ground up while serving those who are most in need.

With thanks to the support from the Centre for Disaster Protection, IFRC has been collaborating with and leveraging the UK Government Actuary's Department expertise in disaster risk financing to push the boundaries of 'business as usual' to scale up anticipatory action. The project explored and identified alternative financing models for the Forecast-based Action by the DREF. The outcome of this fruitful collaboration is the analysis and recommendations captured in this report. On behalf of the IFRC, I would like to thank the UK Government Actuary's Department and in particular Colin Wilson and Georgina Bedenham for their excellent work, which represents the start of a longer conversation on how IFRC can consider risk financing to cover more geographic areas, reach more people at risk and be applied to more types of hazards, including non-hydrometeorological ones. We hope that this report ignites further dialogue and collaboration to unlock the full potential of disaster risk financing for anticipatory humanitarian action.

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International Federation of Red Cross and Red Crescent Societies

1 IFRC 2020 World Disasters Report

## ● EXECUTIVE SUMMARY

It is well known that in the event of a disaster, the speed of response is key. It is increasingly recognised that pre-commitment, readiness preparations, and forecast-based action can dramatically improve effectiveness. In order to maximise impact and ensure that as many needs can be met as possible, it is important to ensure funding is available—but also that this funding is used efficiently. Holding money back to ensure funds are in place, should they be needed, is one way of guaranteeing the funds will be available. But there are other more efficient ways of leveraging funding to ensure that it meets as many humanitarian needs as possible while still ensuring that money is available to meet commitments whenever disasters do occur.

This report examines the alternative options that may be available to the International Federation of Red Cross and Red Crescent Societies (IFRC) when funding its Early Action Protocols (EAPs) through the Forecast-based

Action by the DREF (FbA by the DREF). Each EAP is a formal plan that guides timely and effective implementation of early action when a severe weather or climate forecast shows a high likelihood of critically impacting people in a target area. The EAP contains information on triggers (when to activate), early action (what to do) and funding allocation (with what resources). It describes the step-by-step process for the implementation of early action once a trigger is hit. EAPs address extreme events that occur, on average, every five years, and cover three types of costs: annual readiness costs, one-off pre-positioning costs, and early action costs (once a trigger is reached). Funding for this last set of costs is only released once the pre-agreed trigger is met. This report considers the advantages and disadvantages of the options that may be available when funding these early actions costs, assessing them in line with a key set of criteria to ensure they meet IFRC's principles and objectives.

## ● SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

**1 Not all disasters that could occur will occur, and they certainly will not occur at the same time.** Given the different types of risks that are covered by EAPs, there is an element of diversification of risks borne out of seasonality, different geographical locations, and hazards.

**2 Given that not all disasters that could occur will occur, there is potential to use the funds that have been set aside to meet a greater number of needs.** The probability of every EAP in IFRC's portfolio triggering in any year is extremely small, particularly as the number of EAPs increases. Therefore, holding 100% of funds to cover early action costs for every EAP will not be necessary, as the probability of every EAP triggering in any year is extremely small.

**3 IFRC should consider what its risk tolerance level is, with respect to the level of EAP early action costs that can be met with certainty, in line with its principles and objectives.** By understanding its exposure to the risk of funds being insufficient to cover all costs, IFRC can better manage its commitments and decide on funding options.

**4 A number of different options are available to finance the risk of funds being insufficient to cover all early action costs.** Each has different implications, such as who would own the risk, the certainty with which needs would be met, and practical considerations around operational feasibility.

**5 IFRC should consider how the underlying risks and geographical spread of EAPs may change over time.** Any selected options should take in to account the future potential growth of the fund.

To provide a high-level overview of how adjusting the FbA by the DREF funding structure can maximise humanitarian impact we have presented illustrative analysis, based on the current level of funds in the FbA by the DREF, showing how these funds could be used to cover additional EAPs with a small probability that funds could run out. We then provide a number of financing options that could be used to meet any additional costs should IFRC funds be insufficient. Following any internal IFRC discussion on the conclusions of this paper, we recommend that our analysis is updated, and greater detail is provided on the potential options to support decision-making. This could include allowing for future changes to the risks covered by the fund, modelling annual cashflows, and allowing for transfer of risks and the costs and benefits associated with any options.



## ● INTRODUCTION

### Background

IFRC is a global humanitarian organisation that coordinates and directs international assistance following natural hazards and man-made disasters in non-conflict situations.

IFRC operates the FbA by the DREF, which serves to allocate funding to support the scaling up of anticipatory humanitarian action through EAPs. The 2020 annual fundraising target for the fund amounted to CHF 4.5 million. The FbA by the DREF and the Disaster Relief Emergency Fund (DREF) are managed by the Disasters Climate and Crisis Department and together allocated around CHF 35 million for 2020.

National Red Cross and Red Crescent Societies can have their EAPs approved and funded by the IFRC, setting out the trigger event on which funding would be based and how funds would be used. Each EAP can receive funding of up to CHF 250,000, increasing to CHF 350,000 in 2020. Typically around half is released, once the EAP is approved, to fund readiness activities and pre-positioning of stocks, and the remainder is released within 24 hours of the trigger being reached.

IFRC has approved 14 EAPs (11 active and 3 under

review), with a further 24 in development, and is looking to add to that list over time. EAPs are funded on a 100% reserve basis and therefore IFRC puts funds aside each year in case all EAPs are triggered.

This paper sets out a number of options for financing the EAPs, including criteria and additional considerations to assess them by.

### Limitations

This report considers approaches to funding the risks that may be covered by EAPs under the structure of the FbA by the DREF. It considers a number of financing options, which are intended to be representative of a broad range of potential options available to IFRC and may not be exhaustive. The options have been assessed qualitatively based on criteria agreed with IFRC but this report should not be construed as recommending any particular course of action. In particular, the report is written from an actuarial perspective, and does not represent accounting or legal advice.

The analysis in this report is based on an understanding of the broad characteristics of EAPs, and was carried out based on a number of underlying assumptions that may be subject to change over time.

## ● OBJECTIVES AND PRINCIPLES

In assessing the options set out in this paper we must acknowledge the overall objective of IFRC's FbA by the DREF. Any financing options must make the most effective use of the funding available by reducing the impact of predictable natural hazards on vulnerable people by providing the means for communities to prepare for disasters.

It is important to guarantee funding for those that rely on EAPs so that preparations can be made. Holding money back to ensure funds are in place should triggers be met is one way of guaranteeing the funds will be available, but there are others. This report examines the alternative options and considers their advantages and disadvantages.

Each of the options set out in this paper has been assessed in line with a set of criteria to ensure they meet the following key principles:

- **prioritising needs** – the most significant and urgent needs should be met
- **increasing support** – the more needs that can be met the better
- **speed** – money should be available within 24 hours if protocol funding is triggered.

## ● FUNDING AND RISK EXPOSURE

### Risk exposure

The FbA by the DREF is meant to be used for extreme events. Therefore, EAPs are structured around an event which, when triggered, leads to rapid payment of early action costs. Evidence must be given in the EAPs that they cover events that occur, on average, every five years. Based on the experience of 2020, it would appear that triggers may occur more frequently than this: five of the eight EAPs approved in 2019 triggered in 2020. However, not all EAPs will trigger at the same time and, given the different types of risks that are covered by the EAPs, there is an element of diversification of risks borne out of the seasonality of the trigger events, but also the different geographical locations and hazards covered.

The probability of every EAP in IFRC's portfolio triggering in any year is extremely small, particularly as the number of EAPs increases. To illustrate this point, consider the case where the fund covers one EAP. If that EAP triggers, then funds will be depleted completely. Whereas if the portfolio is made up of 100 EAPs, all 100 EAPs would have to trigger in any one year for funds to be depleted, which would be extremely unlikely. Therefore, there is potential to use the funds available (that at the moment are being set aside for early action commitments) to target a greater number of people by approving additional EAPs. The analysis set out in the annex to this report sets out the assumed structure of the FbA by the DREF, and provides more detail on the underlying risk exposure of EAPs.

### Funding Early Action Protocols

When considering the funds required for each EAP we have assumed that around 50% of the amount is used for readiness and pre-positioning—this has to be in place up front and funding for these elements cannot be raised from elsewhere. The remaining funds are required to cover early action costs; however, these will only be needed if the EAP triggers. Therefore holding 100% of the funds to cover early action costs for every EAP will not be necessary as the probability of every EAP triggering in any year is extremely small.

If IFRC accepts a small possibility that the funds will not be sufficient (and has contingency plans in place for this), then it can hold less than the total possible amount that could be triggered and instead use it to fund additional EAPs. Any shortfall in funding that arises from holding funds lower than the total possible amount needed could be covered in a number of ways. We set out a number of financing options for funding the remaining potential funding shortfall in the next section.

Although calculations can help indicate how likely it is that the fund will run out of money, the decision about what is an appropriate level of risk of the fund being exhausted is an IFRC decision rather than an actuarial one. IFRC should consider what its risk tolerance level is, with respect to the level of EAP early action costs that can be met with certainty, in line with its principles and objectives. Understanding the extent of exposure to the risk of funds being insufficient to cover all costs can help IFRC manage its commitments and decide on funding options.





Forecast-based Financing in Peru. Forecast-based Financing can save people's lives and their livelihoods because it helps people prepare for floods, heavy storms, potential mudslides or snowstorms before they strike. In the Peruvian Andes, forecasts of extreme cold and heavy snows trigger the release of funds and the deployment of Red Cross volunteers/staff before the thermometer starts dropping, allowing Alpaca herders to protect their livestock with medicine and shelters to keep them alive. Credits: Peruvian Red Cross/Bruno Chávez. Copyright Notice: RCRC Magazine

## Understanding the risk of funds running out

To help understand the risk that funds may be insufficient to cover all EAPs, and therefore what may be an appropriate level of funds for the IFRC to hold, we can look at the probability that funds run out due to approving more EAPs than current funding can support. The table below provides a comparison, for a given probability of funds running out, of the number of additional EAPs that could be supported by the fund (in addition to the 11 active EAPs already approved) over one year based on three different scenarios. This table is based on the analysis and assumptions set out in the annex to

this report. The second column shows this for the current level of funds and the underlying assumptions and structure of EAPs. The third column shows the impact if the occurrence of the events were to happen every three years on average (instead of every five years), with all other assumptions remaining the same. In the fourth column, we show the impact if we were to assume that all EAPs had on average 10% correlation to each other (instead of 0% correlation), with all other assumptions remaining the same.

**Table 1: Number of additional EAPs (over and above the 11 active EAPs already approved) supported in each scenario over one year at each probability threshold**

Probability of current level of funds running out	Additional number of EAPs that could be supported over one year		
	Current scenario*	Change trigger occurrence to every three years†	Change correlation assumption to 10%§
0%	8	8	8
1%	16	13	12
5%	18	14	14
10%	18	15	16
25%	19	16	19

### Notes:

\* Assumptions: current level of funds CHF 4.5 million; 11 approved EAPs (readiness and prepositioning costs already paid for); outgo of CHF 250,000 for approved EAPs; CHF 350,000 for new EAPs; and early action costs are 54% of EAP outgo; readiness and prepositioning costs paid upfront for new EAPs (out of starting level of funds) are 46% of outgo; triggers on average every five years; 0% correlation between trigger events.

† All current scenario assumptions are kept the same, except the trigger occurrence, which is changed from every five to every three years on average.

§ All current scenarios are kept the same except the correlation is changed from 0% to 10% on average.

We can see from the table that, under the current level of funds (CHF 4.5 million), a further 16 EAPs (in addition to the 11 current active EAPs) could be funded with a 1% probability of funds running out over one year. The table also shows that the number of potential additional EAPs that could be approved is reduced if on average the event occurs every three years instead of every five years (to 13 additional EAPs). Likewise, if EAPs are assumed to be 10% correlated on average (with events assumed to occur once every five years on average) we can see the number of potential additional EAPs is also lower (12 additional EAPs), as if one trigger occurs, we can assume more will occur.

This table is intended to provide an illustration of the small level of risk that is associated with taking on new EAPs, over and above a level that would be sufficient to fully fund the EAPs, and the impact that correlation and the likelihood of event occurrence has on this. In order to calculate the figures in the table we have assumed a starting level of funds for the year and therefore any further costs accrued (either through readiness and prepositioning costs of new EAPs or subsequent early action costs needed through trigger events) will come out of this funding over one year.

#### **Event occurrence**

In carrying out our analysis we have assumed at a basic level that EAPs will trigger once every five years. This may not be the case in practice. Indeed, we understand a number of EAPs have already triggered, implying that

triggers may occur more frequently than first assumed. The figures we have shown above, and in the annex, are illustrative to show the impact of the trigger occurrence on the funds and to help IFRC to agree a risk tolerance.

#### **Correlation**

Correlation is a relationship that we assume between EAPs. For example, a large tropical cyclone might affect more than one country and so the likelihood of early action funds being needed in two neighbouring countries may be greater than if the risks were independent. If EAPs are positively correlated (i.e. a correlation of greater than 0) then we assume that if one EAP triggers, another is more likely to trigger as well. If there is no correlation between EAPs, we assume that they are independent and are neither more nor less likely to trigger if another EAP triggers. To illustrate the impact of correlation on the level of funds we have used an average correlation assumption of 10% as a comparator.<sup>2</sup> In practice EAPs may be correlated to varying degrees dependent on geography, season and weather phenomenon, such as El Niño. In addition, a number of things could increase the overall probability of trigger events occurring, not just the correlation of events. For example, climate change may lead to an overall increase in the number of trigger events occurring over time.

The annex to this report provides details of our analysis on risk exposure and the impact of correlation and trigger occurrence. It also includes more detail on the underlying assumptions and structure of the fund.

<sup>2</sup> Previous analysis of historical data that we have undertaken, used for a set of hypothetical risks, did not suggest there was significant correlation between disaster events. Given the potential range of risks that could be covered, and because theory might suggest negative relationships between risks as well as positive ones, we have assumed in our base scenario that trigger events are independent. We have chosen 10% correlation as a reasonable assumption to illustrate the impact of covering risks which are positively correlated to each other.



## ● FINANCING OPTIONS AND CRITERIA

As illustrated in the previous section, it is possible to leverage funding in order to accept a greater number of EAPs. Once a risk tolerance level is identified, with respect to the level of EAP early action costs that can be met with certainty, then we can consider how the funds could be topped up in the unlikely event that they turn out to be insufficient. In the following section we have presented

the spectrum of options potentially available for meeting any remaining funding shortfall —all have been included for completeness but not all will be feasible in practice. We have shortlisted the options that best match IFRC's objectives, to ensure that funds are used effectively to meet the needs of the vulnerable, and have assessed these versus the criteria set out below.

### Spectrum of potential options available

The options we have considered can be grouped based on who takes on the risk, and therefore who is responsible for any funding shortfall (see Figure 1).

Figure 1: Risk-owner groupings

<b>1. IFRC retains the risk:</b>	using internal mechanisms to manage the risks
<b>2. Risk is transferred to donors:</b>	establishing frameworks with donors to avoid any funding shortfall
<b>3. Risk is transferred to external market:</b>	using the insurance or capital markets to take on the risk and provide security if the fund drops to unsustainable levels

There are a number of ways for risks to be managed within each group (see Figure 2).

Figure 2: List of potential options by risk-holder

1. IFRC retains the risk:	2. Risk is transferred to donors:	3. Risk is transferred to external market:
<ul style="list-style-type: none"> <li>a) Guarantee fixed sum with discretionary top-up (e.g. CHF 250k + CHF 100k)*</li> <li>b) Guarantee full payment for part of the year (e.g. first nine months of financial year) and reduce guarantee for the remainder of the year if necessary**</li> <li>c) Guarantee full payment if funds are sufficient and reduce guarantee proportionally if insufficient**</li> <li>d) Transfer funds from the DREF to fund the shortfall*</li> <li>e) Self-insure within IFRC e.g. establish a captive style arrangement*</li> </ul>	<ul style="list-style-type: none"> <li>f) Donor agreement to provide an additional donation or bring forward a planned future donation to meet any shortfall that arises*</li> </ul>	<ul style="list-style-type: none"> <li>g) Excess of loss cover from a commercial insurer or reinsurer**</li> <li>h) Alternative investment vehicles e.g. catastrophe bonds, insurance linked securities**</li> <li>i) A non-traditional philanthropic or impact investor commitment to funding any shortfall*</li> </ul>

Notes: \* Short-listed options. \*\* Options not considered in detail.

## Short-listed options

### 1. IFRC retains the risk

#### Option a

Guarantee a fixed sum with discretionary top-up payment when funding is sufficient or subject to certain conditions, for example when readiness and prepositioning costs have been used most effectively.

#### Option d

Maintain a formal mechanism to transfer funds from the DREF to the FbA by the DREF whenever a shortfall occurs.

#### Option e

Self-insure within IFRC by setting up a captive-style arrangement (see Glossary).

In this context we suggest this as an internal mechanism within the IFRC for: accepting, managing and reporting on the collection of EAPs; charging a risk-based premium to take on an EAP; and then paying out if the trigger is met. This would also be a way to smooth funding year on year, as any volatile years where funds are depleted

considerably would be supported by the captive-style arrangement.

### 2. Risk transferred to donors

#### Option f

A donor agreement to provide an additional donation or bring forward a planned future donation if there is a funding shortfall, effectively acting as a form of excess of loss insurance.

### 3. Risk transferred to external market

#### Option i

A non-traditional philanthropic or impact investor may be willing to take on the funding shortfall. One way this may be possible is if an existing donor may be willing to pay a premium to an impact investor directly, and then have them enter into a donor contract with IFRC, effectively acting as an insurer. An example of this is the Vaccine Bonds issued by the International Finance Facility for Immunisation (IFFIm), giving Gavi, the Vaccine Alliance, access to immediate funding.<sup>3</sup>

3 See: [www.gavi.org/investing-gavi/innovative-financing/iffim](http://www.gavi.org/investing-gavi/innovative-financing/iffim)

## Options not considered in detail

### 1. IFRC retains the risk

#### Options b and c

Options (b) Guarantee full payment for part of the year and reduce guarantee for the remainder of the year if necessary and (c) Guarantee full payment if funds are sufficient and reduce guarantee proportionally if insufficient, were not considered in detail.

These options rely on IFRC managing its funds subject to its relative risk appetite. If funds are not sufficient this leads to an element of uncertainty for the national societies and, particularly with option b, an element of inconsistency, which could mean that those most in need lose out on valuable funds and take on this risk. Therefore, because one of the main elements of the FbA by the DREF is guaranteed funding, these options would not help the IFRC to meet all its objectives.

### 3. Risks transferred to external market

#### Options g and h

The options not considered in detail in this grouping were (g) Purchase of excess of loss cover from a commercial insurer or reinsurer and (h) Using alternative investment vehicles, such as catastrophe bonds or other types of insurance-linked securities.

These options assume there will be appetite from external markets to take on the risk but this may be unlikely given the amounts that are being insured here will be small in a commercial insurance context, and there will be complexities of agreeing the arrangement and/or setting up the instruments such as:

- frictional costs may be involved in setting up the contract
- administration and expenses may outweigh the benefits
- determining a price for an evolving level of risks.

Therefore, changes to internal or donor funding could be the most feasible options in this context. However, it is worth exploring the possibility that external markets could take on the risk, for example there could be appetite for options such as multi-year contracts that might bring longer-term benefits.

### Combination of two options

It may be possible to combine the options set out in Figure 2 in order to provide a feasible option, as listed in the following examples.

- The insurance market could take on the residual risk, as set out above, but the more extreme end of the risks, for example if all triggers were to occur at once, could be covered by donor funding.
- Linking a catastrophe bond to a weather phenomenon that is likely to increase the number of triggers occurring, such as El Niño, and then self-insure within IFRC the rest of the time.

These combinations are possible but there are challenges associated with them, similar to the challenges associated with the options that they are made up of. For example, with the catastrophe bond, if IFRC wants certainty in the money being paid out it would need to consider the insured risks around specific events occurring but the triggers associated with the bond payout not being met (so-called 'basis risk'). We have not short-listed any combined options.

### Assessment criteria

- **Increasing number of people being targeted.** Ensuring that as many needs are met as possible, and therefore that humanitarian funding is not held back unnecessarily, is key to meeting IFRC's objectives. We highlight this as the most important criterion.
- **Certainty of being able to meet commitments.** Ensuring that the risk of a funding shortfall is low and therefore funding is available to meet needs.
- **Ownership of risks.** Assessing the adequacy of each option in terms of where the risks lie and therefore who is responsible for meeting any shortfall that arises.
- **Operational feasibility.** Assessing how complex the changes are that are needed to implement the option, given how the current fund operates. This includes considerations such as the effort required in the initial set up of the arrangement and any ongoing administrative and governance requirements.



## Comparison of options against criteria

We have displayed the shortlisted options in a table comparing them against the criteria set out above. We have also included the current scenario for reference. Our comparison is shown through ticks (✓), whereby the greater number of ticks implies that the option provides a good result compared to the criteria. This assessment has

been carried out in a qualitative way using our judgement. The scores are not fixed and are open to interpretation, therefore others may score the options differently. We have provided notes below the table to clarify certain judgements we have made when assessing the options.

**Table 2: Evaluation of short-listed options against criteria**

Options	Increasing number of people being targeted*	Other criteria		
		Certainty of being able to meet commitments	Ownership of risks	Operational feasibility
Current scenario	✓	✓✓✓✓✓	N/A**	✓✓✓✓✓
a) Guaranteed fixed sum with discretionary top-up payment	✓✓✓✓✓	✓✓✓✓***	✓†	✓✓✓✓
d) Transfer funds from the DREF	✓✓✓✓✓	✓✓††	✓✓	✓✓✓✓✓†††
e) Self-insure within IFRC	✓✓✓✓✓	✓✓✓✓§	✓✓✓§§	✓✓
f) Donor agreement to provide an additional donation or bring forward a planned future donation	✓✓✓✓✓	✓✓✓✓§§§	✓✓✓✓	✓✓✓✓
i) Non-traditional philanthropic or impact investor to pre-commit to meeting any shortfall that arises	✓✓✓✓✓	✓✓✓✓✓‡	✓✓✓✓✓	✓✓✓✓

### Notes:

\* Assumes that there is not an opportunity cost from the money being pre-committed to help others elsewhere.

\*\* In the current scenario the risks involved are negligible as there is 100% funding.

\*\*\* Discretionary top-up adds uncertainty in the amount that the protocols will receive and reduces the amount that can support early action.

† National Societies take on the risk as full payment is uncertain.

†† DREF relied upon by a number of IFRC operations so may be difficult to ensure most vulnerable EAP needs are prioritised

††† As there is already a mechanism to transfer funding from the DREF to the FbA by the DREF this option should be easier to implement.

§ This assumes that the captive-style arrangement is functional and has sufficient reserves to support calls on the fund. However, this will depend on the speed with which this can be set up and funding is built up.

§§ A captive-style arrangement could be used to support FbA by the DREF when there is a funding shortfall—however, IFRC would manage the arrangement, so it would retain the risk.

§§§ Donor funding is recorded in advance of payment and therefore there is a risk that money is not available from donors when needed. This risk may be lower if a formal agreement is reached whereby donors have obligations to provide the money when needed.

‡ An investor would provide the funding upfront (and may require some sort of interest in return), therefore the IFRC would have access to funding straight away if it were needed.

## ● CONCLUSIONS AND RECOMMENDATIONS

### Deciding on options

In this report we have presented a number of options for financing EAPs. These options provide a broad range of possible ways of managing the risk associated with funds being insufficient to cover the number of approved protocols. Our focus has been on funding being used to increase the number of protocols covered, and therefore increasing the humanitarian impact.

The funding and risk exposure section of this report, supplemented by our analysis in the annex, illustrates the probability of funds running out based on the number of additional EAPs that can be taken on. This can be used to facilitate internal IFRC discussions on risk tolerance.

Once a risk tolerance level is decided upon, any remaining funding shortfall could be financed using the options set out in the funding options and criteria section of this report. We have set out a variety of options to illustrate the spectrum of possibilities available, but this list is not exhaustive and there may be ways to combine or alter options to suit IFRC's specific circumstances. Similarly, we have shortlisted the options based on our discussions with IFRC as to which options may be the most feasible, but this does not mean the other options could not be considered in practice.

We have set out criteria with which to assess the shortlisted options, based on the objectives of the FbA by the DREF. Our comparison highlights that the current scenario is not the most optimal way of structuring the protocol funding, with the following options scoring highest in our assessment: self-insuring within the IFRC; transferring funds from the DREF; and obtaining further cover from donors or non-traditional philanthropic or impact investors.

Our assessment was carried out in a qualitative way. We have set out below some example additional considerations that might affect the desired option.

### Additional considerations

The following examples highlight some additional areas that the IFRC should consider before deciding on a preferred option.

- The broader the EAP coverage provided in terms of geographical spread and different types of hazards, the greater the volume of EAPs that can be covered for a given level of funding as the level of correlation between events is likely to be lower. Therefore, any selected options should take into account any future perspectives on the protocol coverage and how this may change over time.
- There may be legal arguments for and against certain options. We have not provided an opinion on this and recommend that IFRC consults on the legalities surrounding each option.
- Operationally each of the options will vary in complexity. This should be weighed up against the benefits associated with the options once they are implemented.
- Decisions surrounding the options will need to take into account the sentiment of donors and national societies—there will be political costs to consider as well as financial ones.
- IFRC should review any controls that need to be in place to monitor risks going forward and how any options may affect the current structure and governance surrounding the EAPs.
- As coverage increases, this analysis should be updated regularly to support decision-making on an ongoing basis.



Caption: Through its EAP Mongolia Red Cross aims to reduce the impacts of the extreme winter on vulnerable herder families. Photo credit: Mongolia Red Cross Society.

## Recommendations

This paper examines potential financing options for the forecast-based EAPs. We recommend the following.

- IFRC should consider the options and analysis set out in this paper and how they fit with its objective to ensure the needs of the most vulnerable people are met when disasters occur.
- IFRC should explore the options that may be feasible in practice by:
  - determining the preferences within IFRC to implement any of the internal mechanisms where IFRC takes on the risks associated with holding less than 100% funding to cover early action costs
  - understanding donors' propensity to provide additional funding to support the fund when it is insufficient
  - understanding if there is sufficient appetite within the external market to take on the potential funding shortfall that may be associated with the early action costs of the EAPs.
- Once a preferred set of options is decided upon, we would recommend updating the analysis and considerations in this paper to provide greater detail and aid decision-making. This may include: allowing for future changes to the risks covered by the fund; modelling annual cashflows; and allowing for transfer of risks and the costs and benefits associated with any options.

## ● ANNEX: TECHNICAL DETAIL OF ANALYSIS

### Summary of structure of the fund and underlying assumptions

- EAPs are intended to cover the early action costs associated with a number of trigger events in a number of countries.
- The risks covered are currently weather-related, such as flood and cyclones, but may evolve in the future to cover risks such as pandemics and food insecurity.
- In this analysis we have assumed that risks are uncorrelated. However, we recognise that trigger events may occur at similar times due to seasonality and weather systems such as El Niño.
- Trigger events covered by the protocols are assumed to occur, on average, once every five years.
- Each new protocol has a maximum budget of CHF 350,000—this is assumed to be the average for each new EAP. Those that are approved already have a maximum budget of CHF 250,000—again this is assumed to be the average EAP budget.
- A maximum of 25% of the budget is spent on readiness and a maximum of 40% of the budget is spent on pre-positioning. Using the data from approved protocols, on average 54% of EAP budget is assumed to be spent on readiness and prepositioning costs combined—this is funded upfront by IFRC once an EAP is approved.
- Early action costs make up the remainder of the EAP budget (assumed to be 46%) and are paid on occurrence of the trigger event.
- Annual funding was CHF 4.5 million for 2020 (some of these funds are already held for EAPs that have not triggered in previous years). These funds allow for active EAP commitments and new EAPs expected to be approved over the year.
- Of this fund, 5% is destined for a coordination budget, and 95% is spent on protocols. In our analysis we have assumed 100% is used to fund protocols for ease of illustrating the impact.

### Modelling approach

This analysis has been put together using the assumptions set out above, as agreed with IFRC, and assumes that readiness and prepositioning costs have already been paid for the 11 active EAPs. The annual funding in this analysis therefore covers any new EAPs that require readiness and prepositioning costs to be paid upfront, along with any subsequent early action costs required due to triggers occurring from either existing or new EAPs. We used the assumptions to calculate the amount of funding that might be remaining in the current scenario should varying numbers of new EAPs be taken on, allowing for the probability of the number of possible triggers that could occur and therefore determining the probability of funds being insufficient.

We modelled the probability of triggers occurring, given a total number of EAPs, using a binomial distribution.<sup>4</sup>

We also calculated sensitivities, as set out below, by varying the likelihood of a trigger occurring, as well as the correlation assumption.

To illustrate the impact of correlation we allowed for a 10% average correlation between the trigger probabilities by using a correlated binomial distribution to adjust the probabilities used in our original analysis.<sup>5,6</sup> It is important to note that correlation on its own is insufficient to describe the relationship between the multiple risks being covered and other approaches might be possible e.g. using copulas (see Glossary).

4 This distribution has three criteria: the number of trials (or EAPs in this case) are fixed; the trials are independent; and the probability of success (or a trigger occurring in this case) is exactly the same for each trial.

5 Previous analysis of historical data that we have undertaken, used for a set of hypothetical risks, did not suggest there was significant correlation between disaster events. Given the potential range of risks that could be covered, and because theory might suggest negative relationships between risks as well as positive ones, we have assumed in our base scenario that trigger events are independent. We have chosen 10% correlation as a reasonable assumption to illustrate the impact of covering risks which are positively correlated to each other.

6 G. Schurman (2012) 'The correlated binomial distribution - Part II', available from: [www.appliedbusinesseconomics.com/files/gvscbd03.pdf](http://www.appliedbusinesseconomics.com/files/gvscbd03.pdf) [accessed 23 December 2020].





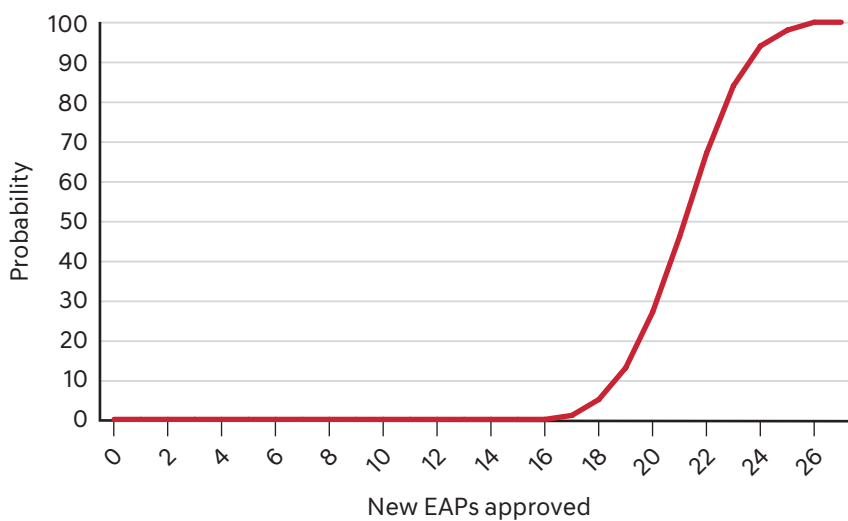
Mozambique women carrying basket on the head and baby behind the back walking home after looked for mussels at Tofo beach, Mozambique

### Impact of funding on EAP capacity

As set out earlier in this report we can look at how the current level of funds held (CHF 4.5 million) could be used to support additional EAPs. Figure A.1 gives an illustration of the number of EAPs that could be approved (in addition to the 11 already active), alongside the

probability that funds would be insufficient to support all the EAPs. It shows that many additional new EAPs could be approved with a very small probability of funds running out over one year.

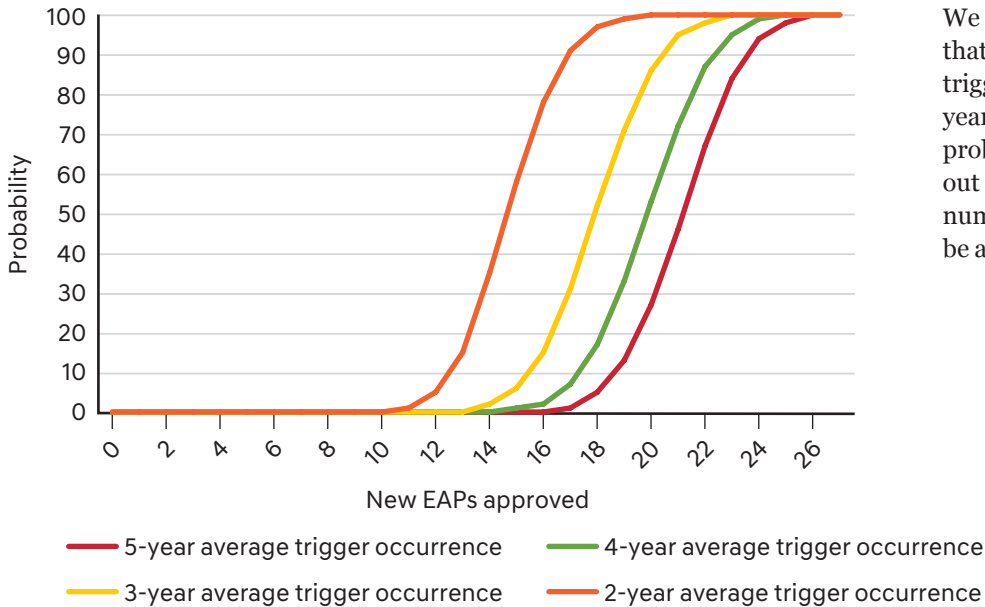
**Figure A.1: Probability of current level of funds running out over one-year given number of additional EAPs approved (over and above the 11 active EAPs already approved)**



## Sensitivities to average trigger occurrence and correlation assumption

Figures A.2 and A.3 show the impact on the number of additional EAPs that can be approved over a one-year period, using the assumptions set out above, but varying the frequency with which we assume the trigger events to occur on average.

**Figure A.2: Probability of current level of funds running out over one year given the number of additional EAPs approved (over and above the 11 active EAPs already approved) at varying average trigger occurrence**



We can see from Figure A.2 that as the probability of a trigger occurring in any one year increases, so the probability of funds running out increases, and therefore the number of new EAPs that can be approved reduces.

**Figure A.3: Probability of current level of funds running out over one-year given number of additional EAPs approved (over and above the 11 active EAPs already approved) with on average no correlation or 10% correlation between EAP**

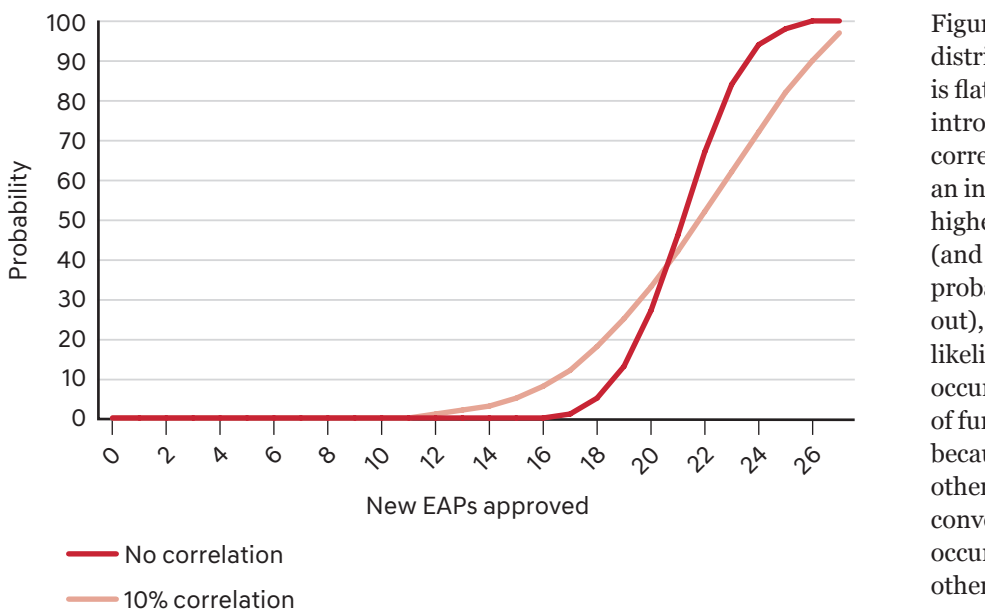


Figure A.3 shows how the distribution of triggers occurring is flatter when correlation is introduced. With the 10% correlation assumption there is an increased likelihood that a higher number of triggers occurs (and therefore a higher probability of funds running out), but also an increased likelihood that very few or none occur (and so a lower probability of funds running out). This is because if one EAP triggers, others are more likely to, but conversely if a trigger does not occur, then it is more likely that other triggers will not occur.

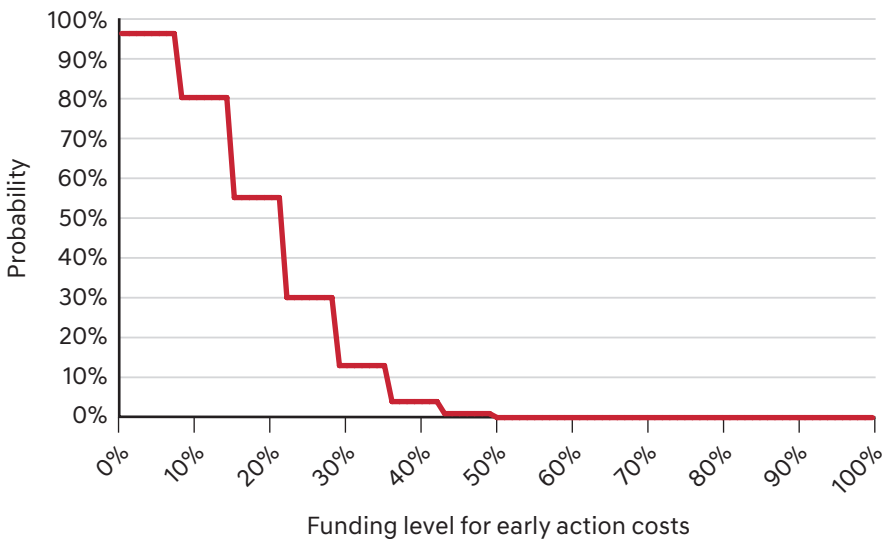


## Risk exposure of EAPs

To illustrate the level of risk in holding varying levels of funding to meet the early action costs of the EAPs (assuming initial funding was based on a specific percentage of EAPs rather than a set budget), Figures A.4 and A.5 show the probability of funds being insufficient over a one-year period.

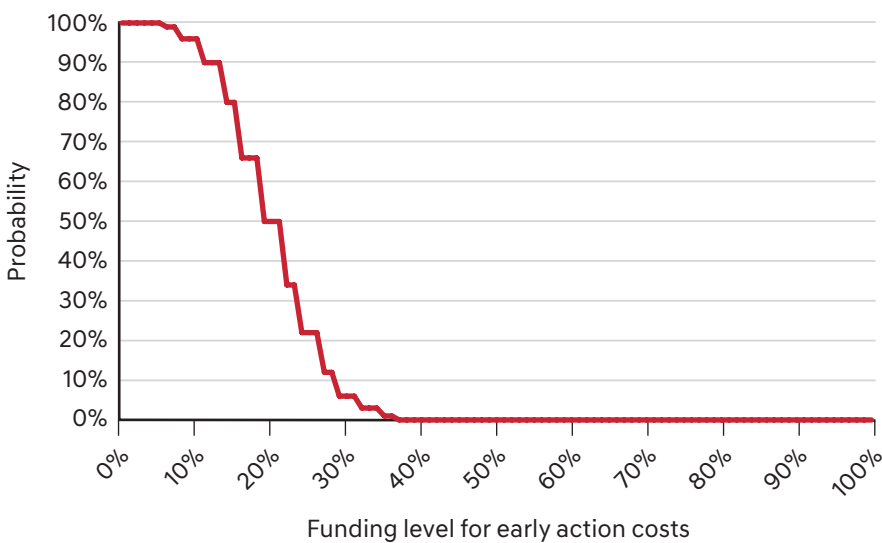
If there were 14 active EAPs and funds were held to cover 50% of their early action costs, funds would run out if there were 8 or more trigger events. We can see from Figure A.4 that the estimated probability of this is 0.2%.

**Figure A.4: Probability of funds running out over one year if funding is held at varying levels assuming 14 EAPs active**



The probability of every EAP triggering in any year is extremely small, particularly as the number of EAPs increases. We can see from the chart below that if we instead had 38 active EAPs, the probability of starting the year with 50% funding for early action costs for 38 EAPs and running out of funds becomes extremely small.

**Figure A.5: Probability of funds running out over one year if funding is held at varying levels assuming 38 EAPs active**



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**Cover image:** Man on horseback cross the river,  
Mongolia after the rains.  
Credit: By Oleg Redekopp, Shutterstock

