

Post-event study – User guide



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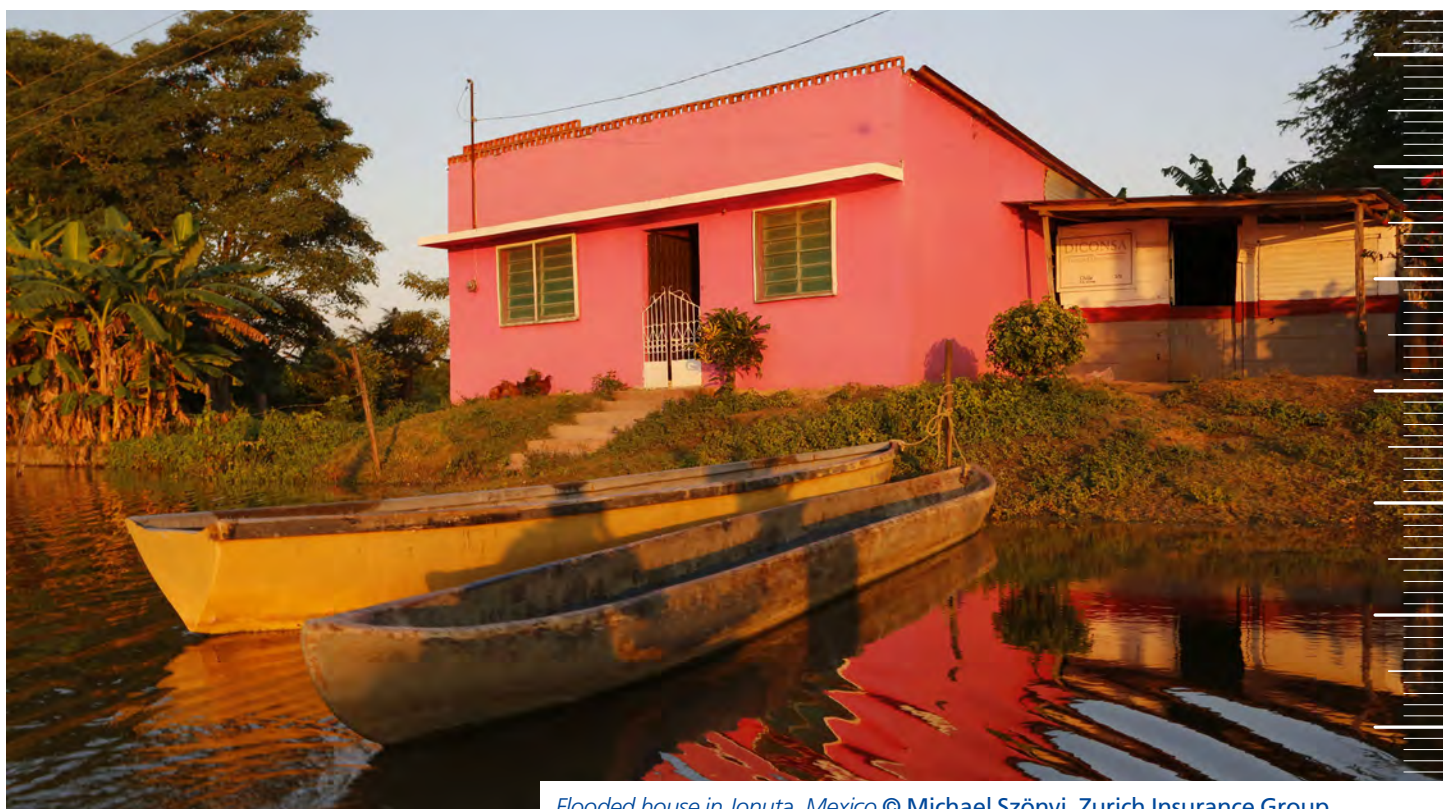
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About this document

This is the User Guide showing you the necessary steps to deploy the post-event study in the Flood Resilience Measurement for Communities (FRMC).

This document is not meant to be used in the field directly with communities or to provide field workers with basic knowledge about the resilience aspects covered. Only trained assessors will need to use this document to measure outcomes, based on data gathered through field work. Similarly, the results will provide data for consideration by implementation teams and research analysis, rather than feeding directly to a community (results will be shared and discussed though).

Naturally, some of the information collected may be used by local governments, NGOs, and possibly other interested parties when they communicate with communities and wider audiences. Many of these stakeholders may already collect most of this data as part of their own evaluations of the event.



Flooded house in Jonuta, Mexico © Michael Szönyi, Zurich Insurance Group

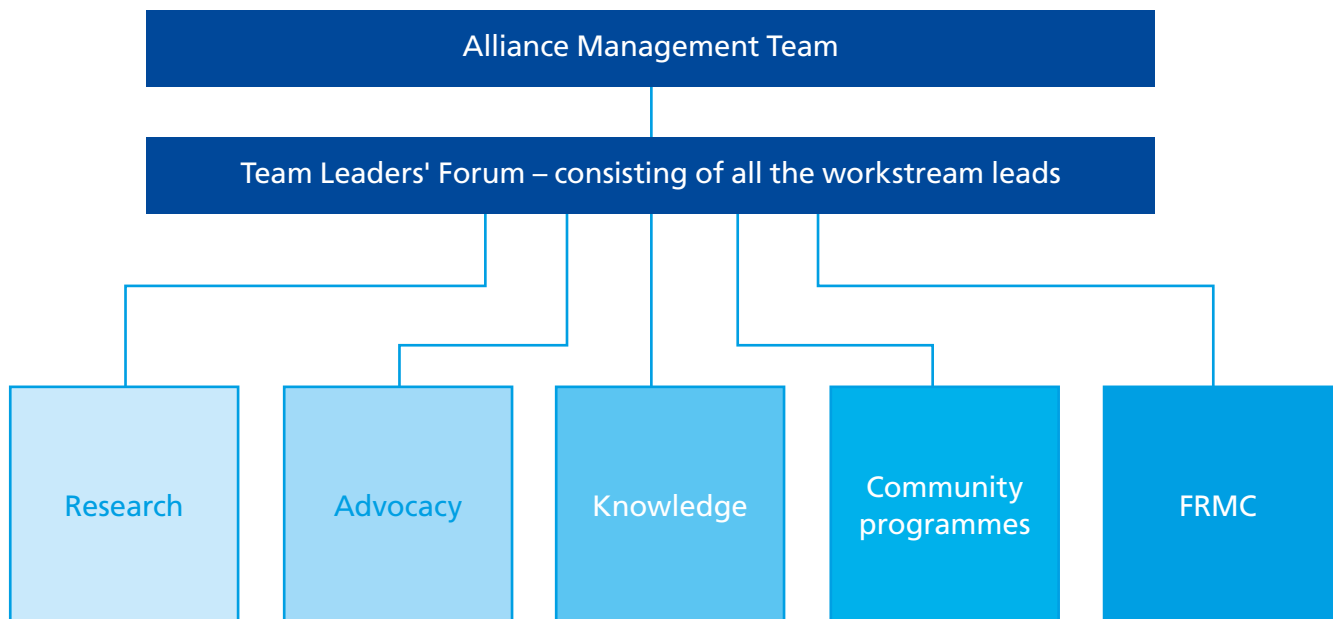
The Zurich Flood Resilience Alliance

Zurich Insurance Group (Zurich) launched a global flood resilience programme in 2013. The programme aimed to advance knowledge, develop expertise, and design strategies to help communities improve their ability to deal with the impact of floods, or build resilience to floods.

To achieve the programme's goals, Zurich formed a multi-year, interdisciplinary alliance (the Zurich Flood Resilience Alliance) to bring in complementary skills and expertise from different organizations. This enabled us to link academic insights, humanitarian sector capabilities, and risk management expertise to improve community resilience to floods.

Zurich works with the humanitarian and civil society organizations Concern Worldwide, the International Federation of the Red Cross and Red Crescent Societies (IFRC), Mercy Corps, Plan International, and Practical Action, as well as research partners the International Institute for Applied Systems and Analysis (IIASA), the London School of Economics, and the Institute for Social and Environmental Transition-International (ISET). Please visit www.zurich.com/flood-resilience and www.floodresilience.net for more details.

The Alliance works in the following areas, with a multi-organizational work stream for each:



Why floods?

Floods affect more people globally than any other type of natural hazard.

And the situation is getting worse, with:

- Increasing population, urbanization, and economic development in hazard-prone areas;
- Increasing loss of life and economic and insured losses due to floods;
- Increasingly interconnected and interdependent flood risks.

Why resilience?

We find: every US\$1 invested in prevention saves \$5 in future losses.¹

But: only 13 per cent of aid spending goes into pre-event resilience and risk reduction; 87 per cent goes to post-event relief.²

We define resilience as the ability of a system, community, or society to pursue its social, ecological, and economic development and growth objectives, while managing its disaster risk over time in a mutually reinforcing way.³

Why measure?

Measurement enables us to assess and demonstrate the real impact of improvements. Since there was no global framework available to do this, we needed to develop a consistent Flood Resilience Measurement Framework and the tools to implement it.

Also, if we have a measurement framework and data, we can contribute to the evidence on how to define resilience. In turn, this will help to increase social, political, and financial investment in building flood resilience.

Why focus on communities?

While acknowledging that national and global drivers play a significant (and essential) part in building flood resilience, we have chosen to focus on the community level. This is the level where flood impacts are felt most immediately and where much action on flood resilience can be taken. It is also the level where we can demonstrate tangible impact on people's lives, creating best practices in the field that can help us shape and influence policy at a higher level.



- 1 Mechler, R., Czajkowski, J., Kunreuther, H., Michel-Kerjan, E., Botzen, W., Keating, A., McQuistan, C., Cooper, N., and O'Donnell, I. (2014) 'Making Communities More Flood Resilient: The Role of Cost-Benefit Analysis and Other Decision-Support Tools in Disaster Risk Reduction', *White Paper*, Zurich Flood Resilience Alliance.
- 2 Kellett, J. and Caravani, A. (2013) *Financing Disaster Risk Reduction: A 20-Year Story of International Aid*, London: ODI; Washington, DC: Global Facility for Disaster Reduction and Recovery at the World Bank.
- 3 Keating, A., Campbell, K., Mechler, R., Magnuszewski, P., Mochizuki, J., Liu, W., Szoenyi, M., and McQuistan, C. (2017) 'Disaster resilience: what it is and how it can engender a meaningful change in development policy', *Development Policy Review* 35(1): 65–91 <<http://dx.doi.org/10.1111/dpr.12201>>.

The Flood Resilience Measurement for Communities

The Flood Resilience Measurement for Communities (FRMC) comprises two parts: the Alliance’s conceptual **framework**⁴ for measuring community flood resilience, and an associated tool for implementing the framework in practice.

The second component of the FRMC – the **tool** – is a practical hybrid software application comprising an online web-based platform for setting up and analysing the process and a smartphone- or tablet-based app that can be used offline in the field for data collection.

In this publication we provide guidance on how to conduct a **post-event study** after a flood has occurred.

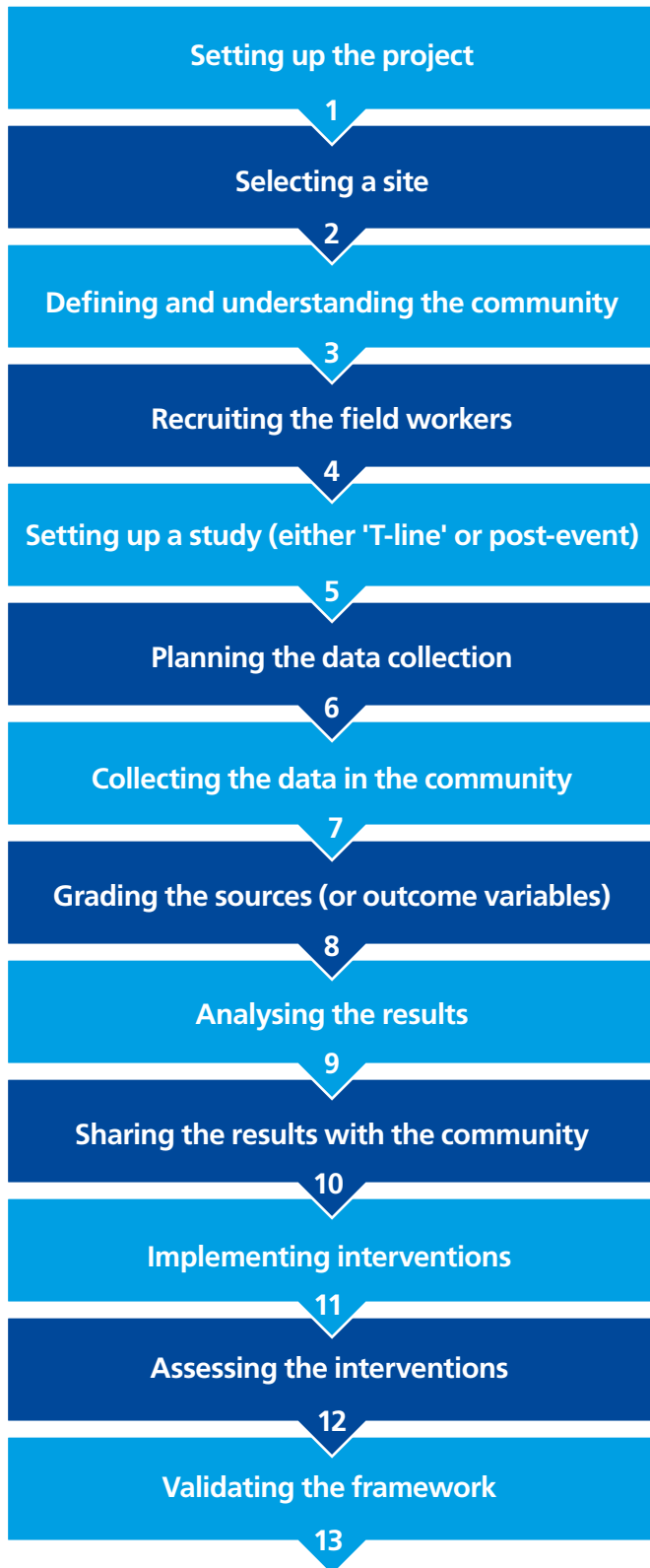
The FRMC process is often part of a wider community disaster risk reduction program and does not stand alone. Certain parts of the process such as project setup and community engagement are meant in the wider sense of the community project, and not just about implementing the measurement using the tool.




After the flood, Lima, Peru © Fidel Carrillo

⁴ For more information on the conceptual framework, please see the FRMC overview: <https://www.floodresilience.net/resources/item/the-flood-resilience-measurement-for-communities-frmc>


The FRMC process




The FRMC tool




- Set up measurement activities
- Select data collection methods
- Assign them to field workers' smartphones




- Collect data based on assigned methods
- Store the data offline
- Send the data to the web application when the job is completed



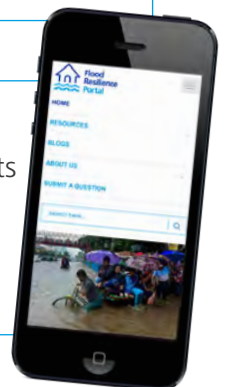
- Consolidate all data for the assessment
- Assign grades using the assessment methodology



- Visualize and analyse the measurement results
- Access guidance on how to interpret the results



- Store the resilience measurement results for comprehensive analysis and validation



Read this before the flood strikes

Staff implementing the FRMC process must be familiar with the post-event study. The post-event study is conducted after a flood occurs in the community at any point during the FRMC process. It is important to understand and set up the post-event study in the FRMC system long before the flood arrives, so that it is ready to be activated when needed.

This document outlines the purpose of a post-event study and explains how to conduct one. A post-event study is separate from FRMC t-line studies (i.e. baseline, midline, and endline studies) and differs from these studies in important ways. This guide explains the key differences between the post-event study and t-line studies and why it is important not to directly compare the two types of study.

What is a post-event study?

A post-event study is conducted in the months after a flood event in order to document and better understand the characteristics of the flood (e.g. type and magnitude of the flood), the impacts of the flood on the community, and the way in which the community and its enabling environment responded.

How is a post-event study different to a t-line study?

T-line studies, sometimes called baseline, midline, or endline studies, measure a community's flood resilience using the 44 'sources of resilience'. The results are used by the community and its stakeholders to help inform resilience-enhancing efforts and to track changes in resilience over time. Each t-line study conducted in the community uses the same 44 sources of resilience, so that a consistent measurement can be taken across different points in time.⁵ For each community where the FRMC process is being used, at least two t-lines (baseline and endline) should be completed, with optional midlines. The recommended time frame

between the end of one t-line study and the start of the next is 18 months. A post-event study should be done whenever a significant flood event occurs at any point between the baseline and endline studies.

Post-event studies measure the outcomes of resilience in relation to one specific flood event using 29 'outcome variables'. These variables are not directly comparable to the 44 sources of resilience from the t-line studies. In a post-event study, we need to measure resilience differently, because we are looking at the impacts of a flood and how the community responded. The impact of and response to one flood event might be different from another flood event due to many factors, including the size or type of the flood (called 'hazard traits' in the post-event study) and what is occurring in the community at that time. The post-event study can provide insights into the community's resilience, but it cannot tell us whether the underlying resilience of the community has increased or decreased over time.

Note: Do not directly compare grades from a post-event study with t-line studies.

⁵ T0: baseline; T1–TN: consecutive studies (midlines and endlines).

Differences between t-line studies and post-event studies

	T-line studies	Post-event studies
Measures	Community resilience at different points over time	Outcomes of resilience to one flood event
Indicators used	44 sources of resilience	29 outcome variables
When	2–3 studies over the project life	1 study following a flood event
Lenses	5 capitals 4 Rs (robustness, redundancy, resourcefulness, rapidity) 7 themes 5 disaster risk management (DRM) cycle categories 2 context levels	7 themes 2 context levels 4 revealed resilience categories
Data collection	Household surveys Focus-group discussions Key informant interviews Secondary source data	[No household surveys] Focus-group discussions Key informant interviews Secondary source data

The post-event study outcome variables

Like the 44 sources of resilience in the t-lines studies, the 29 outcome variables are assigned to a context (community level or enabling environment) and a theme (assets, livelihoods, natural environment, life and health, lifelines, governance, and social norms). Outcome variables are also assigned to a new categorization called ‘revealed resilience’, which has four groups:

- Three ‘hazard trait’ variables about the size and type of flood. These are not graded.
- Seven ‘direct impact’ variables that are graded A–D. A direct impact is one that is caused by contact with flood waters; for example, injuries, damage to homes, or environmental contamination.
- Ten ‘indirect impact’ variables that are graded A–D. An indirect impact is one that is not caused by the direct impact of the flood; for example, lost income (indirect impact) because a shop is flooded (direct impact), causing it to be shut down; ill-health (indirect impact) because of contaminated water (direct impact) after a flood; and fuel shortage (indirect impact) due to flooded roads (direct impact) preventing fuel to be delivered to a given place.
- Nine ‘action’ variables that are graded A–D. Actions are things that people did during and following the flood; for example, the performance of the early-warning system, community members taking out high-interest loans, or support from outside the community.

Post-event study data collection

A post-event study uses the same approach that is used in a t-line study: it involves gathering data and comparing it to grade definitions.

However, there is one key exception: it does not include household survey questions.⁶ All data is gathered through focus-group discussions and key informant interviews with community representatives from all affected groups, including women, youth, and minorities, and secondary sources. The questions that are used to assess the 29 outcome variables are the same regardless of the data-collection method selected. As with t-line studies, collecting data from more than one source (i.e. a group discussion and a key informant interview) is more reliable.



Flood gauge in Germany
© Michael Szönyi, Zurich Insurance Group

The post-event study plan

Putting plans in place to conduct a post-event study before a flood happens means staff will be ready to implement the post-event study when it is needed. The more prepared teams are, the easier and more efficient this process will be. Prepare for the post-event study by drawing up a post-event study plan. The plan template is in Appendix 1.

The plan should include the following information:

- **Staff resources:** who will be responsible for each step of the post-event study, and how will they do it?
- **Budget:** where will the budget required to implement the post-event study come from? Get approval for utilizing this budget as part of the planning process. The project must set aside contingency budgets to enable post-event studies to take place when floods occur in the community. This budgeting process is essential, because the post-event study is just as important as t-line studies.
- **Information collection:** what information will be collected during and following the flood? For example, someone should collect and save news reports and meteorological information.
- **Data collection:** how could data collection for the post-event study be combined with work you already typically do following floods? For example, could you collect data during relief work or when making other impact assessments? Ensure this specifies how data will be collected from all affected groups (i.e. women, minorities, people with disabilities, and different age groups).

Now is the perfect time to set up your post-event study plan.

It is important that you set up the post-event study in the FRMC and draft the post-event study plan early on in the process, so that you are ready in case of an event.

⁶ This is because only a small number of variables can be assessed via household survey question data.

Timeline

Project leaders must be aware of what data is needed to fill out the study and be ready to collect this information during and following the flood. As soon as the flood occurs, start to monitor local media reports and flood-impact assessments done by governments or other bodies.

Now. Read through this guidance document including the outcome variables. Develop your post-event study plan. Set up one post-event study for each community in the FRMC system, but do not activate it yet.

Leading up to the flood. You may have some warning that the flood is coming. This might come from your knowledge about the community's typical flood season, the weather forecasts, or an early-warning system. Also, some floods have a very slow onset, building up over several weeks. As soon as you suspect a flood might be on its way, activate your post-event study plan.

During or immediately after the flood. Activate the post-event studies in the FRMC system for each community that experienced a disaster (see 'Disaster definition' below). During and/or immediately after the flood is the time to collect information on the hazard trait variables. These are most easily identified and collected at the height of the flood (if inundation is persistent) or immediately following the flood (for flash floods or storm surges). We also suggest you monitor media and keep any news reports about the flood for later reference.

One or two months after the flood. The bulk of the data should be collected between one and two months following the end of the flood. At this time, people are starting to recover from the flood, but they have not forgotten or moved on to other priorities. Project leads should consider the best time to conduct focus-group discussions and key informant interviews. Many of the questions in these ask about the extent of the impact and time to recovery, and they cannot be answered until the recovery phase is under way (approximately four to eight weeks following the flood).

Disaster definition: flood size that will trigger a post-event study

A post-event study should be conducted when the flood reaches the level of 'disaster' for the community. A disaster is defined⁷ as 'a serious disruption of the functioning of a community involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources'.

Disaster impacts may include loss of life, injury, disease, and other negative effects on people's physical, mental, and social wellbeing, as well as damage to property, destruction of assets, loss of services, social and economic disruption, and environmental degradation. These impacts are not borne evenly across communities and often exacerbate existing inequalities. It is important to bear in mind that there are a wide range of experiences in a community, and impacts on some individuals or groups may be less apparent. It is critical to ensure a wide range of experiences and perspectives are taken into account when considering disaster impacts, including of people of diverse ages, genders, and abilities.

Some events are clearly disasters due to the high level of disruption and impact, and/or are declared a disaster by the community or authorities. However, if you are unsure whether an event qualifies as a disaster, then ask yourself the following questions:

- Was normal life in the community seriously disrupted for at least one day?
- Were there any deaths and/or injuries?
- Was there widespread damage to property?
- Were normal essential services disrupted?

If you answered 'yes' to two or more of these questions, then you can go ahead with the post-event study.

⁷ UNISDR terminology guide – <https://www.unisdr.org/we/inform/terminology>

Interpreting and using post-event study results

There are four ways to think about and use the results of a post-event study:

- **As a flood impact assessment**, to document and understand the ways in which the community was impacted by the flood and how it responded. By doing a comprehensive impact assessment, staff implementing the FRMC process, the community, and other stakeholders will gain valuable insight into the impact of the flood on the community.
- **As an opportunity to assess, learn, re-evaluate and improve existing flood-resilience interventions, including where and who to target with these.** A post-event study is an important source of information for the ongoing process of improving community resilience. It can help the community, government agencies, NGOs, businesses, and researchers to measure the effectiveness of interventions, and thus to better evaluate and budget for interventions of these types in the future, and target and tailor these to the needs of the community including vulnerable and marginalized groups.

- **To support resilience research and FRMC development.** The Zurich Flood Resilience Alliance research team can use the data collected in t-line and post-event studies to analyze resilience and improve the FRMC approach over time.
- **To advocate for the FRMC approach.** Post-event studies can be a powerful tool to promote your community resilience-enhancing activities. You can demonstrate to local decision-makers how the FRMC approach is used not only to assess a community’s level of resilience and track changes over time (t-lines), and also help us learn from disaster (post-event study).

When interpreting and using post-event results, it is important to remember that t-line study grades cannot be directly compared with post-event study results. T-line studies should only be compared with other t-line studies. For example, it is **meaningless** to say that a community had an average grade of 40 for the education theme sources of resilience in their baseline, and an average grade of 50 for the education theme outcome variables in the post-event study. This is not an indication of improvement. However, it would be possible to look at strengths and weaknesses in a baseline study and think about how those sources of resilience performed during the flood, as in the second bullet point above. The table below goes into more detail on interpreting post-event study results.

Dos and don'ts when interpreting post-event study results

Do	Don't
<ul style="list-style-type: none"> ✓ Document and understand the flood and its impact on the community. ✓ Share results with the community and its stakeholders, ensuring inclusivity of all groups, including vulnerable and marginalized groups. ✓ Use results to learn, analyze, and plan for future floods. ✓ Use the momentum to inform decision-makers about the disaster and show how the FRMC approach helped to gain this information. 	<ul style="list-style-type: none"> ✗ Directly compare grades from a post-event study with t-line studies. ✗ Use the post-event study to draw conclusions about whether community resilience has improved or not.

Post-event study variables

Code	Name	Revealed Resilience (variable type)	Page
O01	Flood return period (not graded)	Hazard trait	14
O02	Flood type (not graded)	Hazard trait	15
O03	Percentage of the community directly impacted (not graded)	Hazard trait	17
O04	Prevention of fatalities	Direct impact	18
O05	Prevention of serious injuries	Direct impact	20
O06	Private building and land damage	Direct impact	22
O07	Public building and land damage	Direct impact	25
O08	Contents and equipment loss	Direct impact	27
O09	Large scale protection infrastructure performance	Direct impact	29
O10	Environmental contamination	Direct impact	31
O11	Post-event illness	Indirect impact	33
O12	Flood healthcare continuity	Indirect impact	36
O13	Continuity of education	Indirect impact	39
O14	Household income stability	Indirect impact	43
O15	Food security	Indirect impact	46
O16	Communications performance	Indirect impact	49
O17	Transportation performance	Indirect impact	52
O18	Safe water	Indirect impact	54
O19	Waste management performance	Indirect impact	56
O20	Continuity of energy and fuel supply	Indirect impact	58
O21	Property crime	Action	61
O22	Learning from flood	Action	63
O23	Early warning system performance	Action	65
O24	Mutual support	Action	68
O25	External support	Action	70
O26	Sale of productive assets	Action	72
O27	Risky livelihoods	Action	74
O28	High interest credit	Action	76
O29	Insurance payments	Action	78

Indicator O01: Flood return period

Revealed resilience: Hazard trait

Context: Enabling environment

Theme: N/A

Definition: This measure asks for an estimate of the return period of a flood, whether it is a common flood or a very catastrophic and unexpected one. Floods are often measured in return periods – a flood high of x has a return period of 100 years, which means each year there is a 1% chance of a flood of that height and extent occurring. How resilient a community is may depend on the severity of the flood, which is why we need to gather this data – this measure is not graded A-D.

Notes: N/A

A grade criteria	B grade criteria	C grade criteria	D grade criteria
N/A	N/A	N/A	N/A

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What is the return period or re-occurrence interval of this flood, in number of years? In other words, how often is a flood of this size or bigger expected/ experienced in the community?	A return period tells you how often a flood of this size or bigger is expected. The smaller the return period, the bigger the flood – a 100 year flood is expected very rarely – it has a 0.1% chance of occurring every year. A 2 year flood is expected more commonly, it has a 50% chance of occurring every year.	Numeric	

Indicator O02: Flood type

Revealed resilience: Hazard trait

Context: Enabling environment

Theme: N/A

Notes: N/A

Definition: This measure asks what type of flood is being assessed by this post-event study. This measure is not graded A–D.

Notes: N/A

A grade criteria	B grade criteria	C grade criteria	D grade criteria
N/A	N/A	N/A	N/A

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What sort of flood was this?	<p>Flash floods – Flash floods are caused by heavy rain or the sudden release of water over a short period of time. They occur within minutes to hours after the heavy rain event, and produce raging torrents of water that move with great speed. While the majority of flash floods are triggered by torrential rain falling within a short amount of time (like during intense storms), they can also occur even if no rain has fallen via sudden release of water from a levee and dam breaks or by a debris or ice jams.</p> <p>River floods – River flooding occurs when water levels in rivers, lakes, and streams rise and overflow onto the surrounding banks, shores, and neighbouring land. The water level rise could be due to excessive rain or snowmelt.</p> <p>Coastal floods – Coastal flooding is the inundation of land areas along the coast by seawater. Common causes of coastal flooding are high tide, tsunamis and storm surge.</p> <p>Surface floods – Surface floods occur gradually and hence people have time to go indoors or leave the area. The layer of water is low to the ground (rarely more than 1 meter) and causes no immediate threat to lives. However depending on the flooded area it may cause significant economic damage.</p>	Option	<ul style="list-style-type: none"> – Flash flood – River flood – Coastal flood – Surface flood – Don't know

Question	Guidance notes	Question type	Answer options
What sort of flood was this?	In urban areas, surface flooding occurs when there is a lack of drainage, meaning that water that would otherwise soak into the soil cannot travel through paved surfaces, and so it is redirected into sewage and storm drain systems. Flooding occurs when the amount of water flowing into drainage systems overwhelms the systems. In rural areas, surface flooding (sometimes called pluvial flooding or ponding) occurs in relatively flat areas. Rain water is normally stored in the ground, canals or lakes, or is drained away or pumped out. Flooding occurs when more water enters the water system than can be stored or can leave the system. In this case, rain is the source of the flood: not water coming from a river, but water on its way to the river. Puddles and ponds develop and canals are filled and spill over; gradually a layer of water covers the land.	Option	<ul style="list-style-type: none"> – Flash flood – River flood – Coastal flood – Surface flood – Don't know
Was this type of flood expected in the community?	If the community experienced a type of flood – flash, river, coastal or surface – that was not expected, indicate this here.	Option	<ul style="list-style-type: none"> – This type of flood was expected – This type of flood was not expected – Don't know
Please provide a short description of the conditions that led to the flood (not the impacts).	The conditions that led to the flood might be weather conditions such as heavy rainfall in the upper basin, snow melt, a burst levee, or some other event.	Text	



Flooded house in Lake Skadar region of Montenegro © Montenegro Red Cross

Indicator O03: Percentage of the community directly impacted

Revealed resilience: Hazard trait

Context: Enabling environment

Theme: N/A

Notes: N/A

Definition: This measure asks what percentage of the community was directly impacted by the flood. ‘Directly impacted’ means a community member had to evacuate due to the flood, and/or their property e.g. home, farm or business premises – came in contact with flood waters. This measure is not graded A-D.

Notes: N/A

A grade criteria	B grade criteria	C grade criteria	D grade criteria
N/A	N/A	N/A	N/A

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What percentage of the community was directly impacted by the flood?	‘Directly impacted’ means a community member had to evacuate, and/or their property – e.g. home, farm or business premises – came in contact with flood waters.	Percentage	



Rescue practice during mock drill in Chosica, Peru © Giorgio Madueño, Practical Action

Indicator O04: Prevention of fatalities

Revealed resilience: Direct impact

Context: Community level

Theme: Life and health

Definition: Fatalities are the most direct and devastating loss from floods. A resilient community is one where fatalities from floods are kept to an absolute minimum. This outcome indicator is concerned with fatalities which resulted directly from the flood event, such as drownings or fatal injuries, not fatalities from indirect flood impacts such as post-event illness.

Notes: This outcome indicator is concerned with fatalities which resulted from the flood event, but could have been prevented by better preparedness such as if there had been more awareness on when or how to evacuate, first aid training, or safe evacuation routes. Sometimes fatalities occur even when all possible preparedness has taken place.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>Maximum possible prevention of fatalities from flooding was achieved during the flood disaster.</p> <p><i>or</i></p> <p>There were no fatalities from the flood disaster.</p>	<p>Some actions to prevent fatalities were taken, which worked reasonably well. There is room for some improvements to prevent flood fatalities.</p>	<p>Some actions to prevent fatalities were taken; however much more could have been done to prevent fatalities.</p>	<p>No actions taken to prevent fatalities, or actions unintentionally caused fatalities.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How many men in the community lost their life in the flood?	Approach this question sensitively. Record the number of men who lost their life in the flood due to drowning or injuries. Do not count deaths from things that happened after the flood, for example, a heart attack in an evacuation centre or a disease outbreak after the flood.	Numeric	
How many women in the community lost their life in the flood?	Approach this question sensitively. Record the number of women who lost their life in the flood due to drowning or injuries. Do not count deaths from things that happened after the flood, for example, a heart attack in an evacuation centre or a disease outbreak after the flood.	Numeric	

Question	Guidance notes	Question type	Answer options
How many children in the community lost their life in the flood?	Approach this question sensitively. Record the number of children who lost their life in the flood due to drowning or injuries. Do not count deaths from things that happened after the flood, for example, a heart attack in an evacuation centre or a disease outbreak after the flood.	Numeric	
If fatalities occurred, what could have been done before the flood to prevent fatalities?	Approach this question sensitively.	Text	



First aid training © Mexico Red Cross

Indicator O05: Prevention of serious injuries

Revealed resilience: Direct impact

Context: Community level

Theme: Life and health

Definition: A resilient community is one where serious injuries from floods are kept to an absolute minimum. This outcome indicator is concerned with serious injuries which resulted directly from the flood event – do not include indirect impacts such as post-event illness.

Notes: This outcome indicator is concerned with serious injuries which resulted from the flood event, but could have been prevented by better preparedness such as if there had been more awareness on when or how to evacuate, first aid training, or safe evacuation routes. Sometimes serious injuries occur even when all possible preparedness has taken place. Serious injuries are defined as ones that prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioral disturbance or disorder and those that result in a miscarriage.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>Maximum possible prevention of serious injuries from flooding was achieved during the flood disaster.</p> <p>or</p> <p>There were no serious injuries from the flood disaster.</p>	<p>Some actions to prevent serious injuries were taken which worked reasonably well.</p> <p>There is room for some improvements to prevent serious injuries.</p>	<p>Some actions to prevent serious injuries were taken, however much more could have been done to prevent serious injuries.</p>	<p>No actions taken to prevent serious injuries, or actions unintentionally caused serious injuries.</p>



Mock drill evacuation practice © Archana Gurung, Practical Action

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How many men in the community suffered serious injuries in the flood?	Approach this question sensitively. Record the number of men who suffered serious injuries in the flood. Do not count injuries from things that happened after the flood, for example, an accident in an evacuation centre or a disease outbreak after the flood. A serious injury is one that prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.	Numeric	
How many women in the community suffered serious injuries in the flood?	Approach this question sensitively. Record the number of women who suffered serious injuries in the flood. Do not count injuries from things that happened after the flood, for example, an accident in an evacuation centre or a disease outbreak after the flood. A serious injury is one that prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.	Numeric	
How many children in the community suffered serious injuries in the flood?	Approach this question sensitively. Record the number of children who suffered serious injuries in the flood. Do not count injuries from things that happened after the flood, for example, an accident in an evacuation centre or a disease outbreak after the flood. A serious injury is one that prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.	Numeric	
If serious injuries occurred, what could have been done before the flood these from happening?	Approach this question sensitively. A serious injury is one that prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.	Text	

Indicator O06: Private building and land damage

Revealed resilience: Direct impact

Context: Community level

Theme: Assets

Definition: This outcome variable relates to damaged buildings and land, specifically homes and business premises (buildings that are owned by people or corporations) due to the flood event. Damage and destruction to physical capital are one of the most direct and obvious losses from floods. A resilient community is one where damage to buildings and land from floods is minimized.

Notes: N/A

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>0% of all dwellings, business premises and agricultural land suffered major damage to houses and business premises due to the flood.</p> <p><i>and</i></p> <p>Repair to 80% of all damage expected within three months.</p>	<p>Less than 10% of dwellings, business premises and agricultural land suffered major damage to houses and business premises due to the flood.</p> <p><i>and</i></p> <p>Repair to 80% of all damage expected within 6 months.</p>	<p>Less than 40% of dwellings, business premises and agricultural land suffered major damage to houses and business premises due to the flood.</p> <p><i>and</i></p> <p>Repair to 80% of all damage expected within 12 months.</p>	<p>More than 40% of dwellings, business premises and agricultural lands suffered major damage to houses and business premises due to the flood.</p> <p><i>or</i></p> <p>Repair to 80% of all damage expected to take longer than 12 months.</p>



Flood damaged building in Piura, Peru © Michael Szönyi, Zurich Insurance Group

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How many dwellings suffered major damage due to the flood?	<p>A dwelling is a building or part of a building where people live – houses, shacks, flats/apartments, group homes are all types of dwellings.</p> <p>Minor damage requires repairs but does not make the dwelling uninhabitable. Major damage means the dwelling is uninhabitable until repairs are completed. If a dwelling is completely destroyed, count this as ‘major damage’. A home where the kitchen has been destroyed is major damage, since food preparation is a basic need (even if people do continue to live there in bad conditions). A home with some water damage but is still habitable, is minor damage.</p> <p>A building/land cannot have both minor and major damage.</p>	Numeric	
How many dwellings suffered minor damage due to the flood?	<p>A dwelling is a building or part of a building where people live – houses, shacks, flats/apartments, group homes are all types of dwellings.</p> <p>Minor damage requires repairs but does not make the dwelling uninhabitable. Major damage means the dwelling is uninhabitable until repairs are completed. If a dwelling is completely destroyed, count this as ‘major damage’. A home where the kitchen has been destroyed is major damage, since food preparation is a basic need (even if people do continue to live there in bad conditions). A home with some water damage but is still habitable, is minor damage.</p> <p>A building/land cannot have both minor and major damage.</p>	Numeric	
How many business premises suffered major damage due to the flood?	<p>Business premises are places such as shops, factories, workshops, storage locations etc.</p> <p>Minor damage requires repairs but does not make the business premises uninhabitable. Major damage means the business premises is uninhabitable until repairs are completed. If a business premises is completely destroyed, count this as ‘major damage’. A business premises with water damage to the flooring that can still operate, is minor damage.</p> <p>A business premises cannot have both minor and major damage.</p>	Numeric	
How many business premises suffered minor damage due to the flood?	<p>Business premises are places such as shops, factories, workshops, storage locations etc.</p> <p>Minor damage requires repairs but does not make the business premises unusable. Major damage means the business premises is unusable until repairs are completed. If a business premises is completely destroyed, count this as ‘major damage’. A business premises with water damage to the flooring that can still operate, is minor damage.</p> <p>A business premises cannot have both minor and major damage.</p>	Numeric	

Question	Guidance notes	Question type	Answer options
How many farms or agricultural livelihoods had their agricultural areas/plots suffer major damage due to the flood?	<p>Agricultural land is any land that people use for agriculture including cropping, horticulture, animal husbandry, grazing, and forestry.</p> <p>Minor damage requires repairs but does not make the agricultural activities impossible. Major damage means the agricultural activities are impossible, until repairs are completed. If an agricultural land area/plot is completely destroyed, count this as 'major damage'. A farm that has had some damage done to some areas but is still functioning, has suffered minor damage. A farm that has lost a whole season's crop, has suffered major damage.</p> <p>A land area cannot have both minor and major damage.</p>	Numeric	
How many farms or agricultural livelihoods had their agricultural areas/plots suffer minor damage due to the flood?	<p>Agricultural land is any land that people use for agriculture including cropping, horticulture, animal husbandry, grazing, and forestry.</p> <p>Minor damage requires repairs but does not make the agricultural activities impossible. Major damage means the agricultural activities are impossible, until repairs are completed. If an agricultural land area/plot is completely destroyed, count this as 'major damage'. A farm that has had some damage done to some areas but is still functioning, has suffered minor damage. A farm that has lost a whole season's crop, has suffered major damage.</p> <p>A land area cannot have both minor and major damage.</p>	Numeric	
What percentage of all dwellings, business premises and agricultural areas/plots suffered major damage due to the flood?	<p>A dwelling is a building or part of a building where people live – houses, shacks, flats/apartments, group homes are all types of dwellings.</p> <p>Business premises are places such as shops, factories, workshops, storage locations etc. Agricultural land is any land that people use for agriculture including cropping, horticulture, animal husbandry, grazing, and forestry.</p> <p>To calculate percentages, add together the total number of dwellings, business premises and agricultural land that suffered major damage. Then count or estimate the total number of dwellings, business premises and agricultural land in the community. Divide the number that suffered major damage by the total number, and multiply by 100.</p>	Percent	
For the damage that the community wants repaired, how long is it expected it take to repair 80% of the damage done to private buildings and land?	<p>A community may not want to repair damage if an area is considered unsafe and/or should be re-purposed.</p>	Option	<ul style="list-style-type: none"> – Less than 3 months – Between 3 and 6 months – Between 7 and 12 months – Longer than 12 months or not at all

Indicator O07: Public building and land damage

Revealed resilience: Direct impact

Context: Community level

Theme: Assets

Definition: This outcome variable relates to damaged public buildings and land areas (buildings that are owned by government, religious organizations, community groups, or are communal) due to the flood event. Damage and destruction to physical capital are one of the most direct and obvious losses from floods. A resilient community is one where damage to buildings and land from floods is minimized.

Notes: Public buildings include: community buildings such as halls, healthcare facilities; educational facilities; government buildings, and religious buildings. Public lands include park lands and recreational areas, sporting fields and communal resources such as communal grazing areas.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
0% of all public buildings and lands suffered major damage due to the flood. <i>and</i> Repair to 80% of all damage expected within three months.	Less than 10% of all public buildings and lands suffered major damage due to the flood. <i>and</i> Repair to 80% of all damage expected within 6 months.	Less than 40% of all public buildings and lands suffered major damage due to the flood. <i>and</i> Repair to 80% of all damage expected within 12 months.	More than 40% of all public buildings and lands suffered major damage due to the flood. <i>or</i> Repair to 80% of all damage expected to take longer than 12 months.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How many public buildings suffered major damage due to the flood?	Public buildings include: community buildings such as halls, healthcare facilities; educational facilities; government buildings and religious buildings. Minor damage requires repairs but does not make the building or lands non-functional. Major damage means the building or land cannot be used until damage is repaired. If a building or area has been completely destroyed, count this as 'major damage'. A building cannot have both minor and major damage.	Numeric	

Question	Guidance notes	Question type	Answer options
How many public buildings suffered minor damage due to the flood?	<p>Public buildings include: community buildings such as halls, healthcare facilities; educational facilities; government buildings and religious buildings.</p> <p>Minor damage requires repairs but does not make the building or lands non-functional. Major damage means the building or land cannot be used until damage is repaired. If a building or area has been completely destroyed, count this as 'major damage'.</p> <p>A building cannot have both minor and major damage.</p>	Numeric	
How many public land areas suffered major damage due to the flood?	<p>Public lands include park lands and recreational areas, sporting fields and communal resources such as communal grazing areas.</p> <p>Minor damage requires repairs but does not make the lands non-functional. Major damage means the land cannot be used until damage is repaired. If a land area has been completely destroyed, count this as 'major damage'.</p> <p>A land area cannot have both minor and major damage.</p>	Numeric	
How many public land areas suffered minor damage due to the flood?	<p>Public lands include park lands and recreational areas, sporting fields and communal resources such as communal grazing areas.</p> <p>Minor damage requires repairs but does not make the lands non-functional. Major damage means the land cannot be used until damage is repaired. If a land area has been completely destroyed, count this as 'major damage'.</p> <p>A land area cannot have both minor and major damage.</p>	Numeric	
What percentage of all public buildings and land areas suffered major damage due to the flood?	<p>To calculate percentages, add together the total number of public buildings land areas that suffered major damage. Then count or estimate the total number of public buildings and land areas in the community. Divide the number that suffered major damage by the total number, and multiply by 100. Percentages for buildings or land should not add up to more than 100% – a building/land cannot have both minor and major damage.</p>	Percent	
For the damage that the community wants repaired, how long is it expected to take to repair 80% of the damage done to public buildings and land areas?	<p>A community may not want to repair damage if an area is considered unsafe and/or should be re-purposed.</p>	Option	<ul style="list-style-type: none"> – Less than 3 months – Between 3 and 6 months – Between 7 and 12 months – Longer than 12 months or not at all

Indicator O08: Contents and equipment loss

Revealed resilience: Direct impact

Context: Community level

Theme: Assets

Definition: This outcome variable relates to loss or destruction of physical assets – contents and equipment loss, due to the flood event. Damage and destruction to physical capital are one of the most direct and obvious losses from floods, a resilient community is one where property damage from floods is minimized.

Notes: Count all households, business and livelihood/income generation activities, and public organizations who have had contents and equipment lost or destroyed due to the flood.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Less than 20% of all households, businesses, livelihood/income generation activities and other organizations had contents or equipment lost or destroyed.	20% to less than 50% of all households, businesses, livelihood/income generation activities and other organizations had contents or equipment lost or destroyed.	50-80% of all households, businesses, livelihood/income generation activities and other organizations had contents or equipment lost or destroyed.	More than 80% of all households, businesses, livelihood/income generation activities and other organizations had contents or equipment lost or destroyed.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How many households had contents or equipment lost or destroyed?	Count all households which have had property lost or destroyed due to the flood. For example, if a household has a motorcycle washed away and their television is destroyed, count one. If a household runs a business from their home and has both consumer goods (such as a radio and refrigerator) and livelihood goods (such as a sewing machine and fabric) destroyed, count once here and once in the later question. Vehicles, livestock and pets are considered property for the purposes of this variable.	Numeric	
How many businesses and livelihood/income generation activities had contents or equipment destroyed?	Count all businesses and livelihood/income generation activities which have had property lost or destroyed due to the flood. For example, if a business has stock and/or machinery destroyed, count one. If a subsistence farm had a tractor and grain stores lost, count one. If a household runs a business from their home and has both consumer goods (such as a radio and refrigerator) and livelihood goods (such as a sewing machine and fabric) destroyed, count one here for the business/livelihood activity. Vehicles, livestock and pets are considered property for the purposes of this variable.	Numeric	

Question	Guidance notes	Question type	Answer options
How many public organizations (government, community organizations, civil society organizations, religious groups etc. in the community) had contents or equipment destroyed?	Count all public organizations which have had property lost or destroyed due to the flood. For example, if a government office has had computers and office equipment destroyed, count one. If a religious organization has had records and a vehicle destroyed, count one. Vehicles, livestock and pets are considered property for the purposes of this variable.	Numeric	
What percentage of all households, businesses and livelihood/income generation activities, and public organizations had property destroyed?	To calculate percentages, add together the total number of households, businesses, livelihood operations, and other organizations that had contents or equipment lost or destroyed. Then count or estimate the total number of households, businesses, livelihood operations, and other organizations in the community. Divide the number that suffered major damage by the total number, and multiple by 100.	Percent	



Young woman attending vocational training in Bangladesh © Plaban Ganguly, Practical Action

Indicator O09: Large scale protection infrastructure performance

Revealed resilience: Direct impact

Context: Enabling environment

Theme: Assets

Definition: This outcome variable relates to the performance of large-scale flood protection infrastructure during the flood event. These types of flood protection measures are organized at or above the community level (e.g. community-wide, integrated with neighbouring communities or at regional, state or watershed level) and not at the household level. Whether flood protection infrastructure functioned well, or failed, has a significant impact on flood damages.

Notes: Assess whether flood protection infrastructure was able to withstand the flood. If the infrastructure failed, assess whether the failure itself caused additional problems. Flood protection infrastructure includes levees, dykes, seawalls, flood gates, and retention ponds. Infrastructure failure happens when the infrastructure is overwhelmed by the flood water volume or velocity. In the event of failure, how the infrastructure fails matters. A 'good' failure means the infrastructure was overwhelmed, but still provided some protection – for example, a dyke that was over-topped but still provided flood protection. A 'bad' failure means the infrastructure was overwhelmed and stopped providing any protection – for example, a dyke that was breached or a seawall that collapsed during the flood.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
All flood protection infrastructure performed well during the flood, with no failures.	Some flood protection infrastructure was overwhelmed, but had a 'good' failure and continued to provide protection.	Some flood protection infrastructure was overwhelmed and had a 'bad' failure, removing protection during the flood event.	All flood protection infrastructure was overwhelmed and had a 'bad' failure, removing protection during the flood event. <i>or</i> The community has no flood protection infrastructure.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What flood protection infrastructure was present to protect the community before the flood occurred? (Tick all that apply.)</p>	<p>Large-scale flood protection infrastructure includes levees, dykes, seawalls, flood gates, and retention ponds. These types of flood protection measures are organized at or above the community level (e.g. community-wide, integrated with neighbouring communities or at regional, state or watershed level) and not at the household level.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – Levee – Dyke – Sea wall – Flood gates – Retention ponds – Other – Don't know
<p>Was any large-scale flood protection infrastructure overwhelmed by the flood, but remained functional and intact (good failure)?</p>	<p>Large-scale flood protection infrastructure includes levees, dykes, seawalls, flood gates, and retention ponds. These types of flood protection measures are organized at or above the community level (e.g. community-wide, integrated with neighbouring communities or at regional, state or watershed level) and not at the household level. Infrastructure failure happens when the infrastructure is overwhelmed by the flood water volume or velocity. In the event of failure, how the infrastructure fails matters. A 'good' failure means the infrastructure was overwhelmed, but still provided some protection – for example, a dyke that was over-topped but still provided flood protection. A 'bad' failure means the infrastructure was overwhelmed and stopped providing any protection – for example, a dyke that was breached or a seawall that collapsed during the flood.</p>	<p>Option</p>	<ul style="list-style-type: none"> – Yes – No – Don't know
<p>Please describe the performance of large-scale flood protection infrastructure during the flood.</p>	<p>Large-scale flood protection infrastructure includes levees, dykes, seawalls, flood gates, and retention ponds. These types of flood protection measures are organized at or above the community level (e.g. community-wide, integrated with neighbouring communities or at regional, state or watershed level) and not at the household level. Infrastructure failure happens when the infrastructure is overwhelmed by the flood water volume or velocity. In the event of failure, how the infrastructure fails matters. A 'good' failure means the infrastructure was overwhelmed, but still provided some protection – for example, a dyke that was over-topped but still provided flood protection. A 'bad' failure means the infrastructure was overwhelmed and stopped providing any protection – for example, a dyke that was breached or a seawall that collapsed during the flood.</p>	<p>Text</p>	

Indicator O10: Environmental contamination

Revealed resilience: Direct impact

Context: Community level

Theme: Natural environment

Definition: This outcome variable is concerned with whether and to what extent the flood resulted in contamination of the environment. A resilient community ensures its environments are not contaminated in the event of a flood.

Notes: Flood water can disperse debris such as tree and stones or even pieces of houses or other structures. Flood water can also spread pollutants such as sewage, bacteria, pesticides and other chemicals which can contaminate environments.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
The environments which support community livelihoods and local natural habitats were not contaminated due to the flood.	The environments which support community livelihoods and local natural habitats were mildly contaminated due to the flood. <i>and</i> Recovery will be quick and require minimal effort.	The environments which support community livelihoods and local natural habitats were significantly contaminated due to the flood. <i>and</i> Recovery will require some time and contribution to clean-up.	The environments which support community livelihoods and local natural habitats were severely contaminated due to the flood. <i>or</i> The natural environment will not recover for more than one year.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
How much did the flood spread debris throughout the environment?	Floods can contaminate the environment by dispersing debris such as tree and stones, pieces of structures like houses, machinery, and other debris.	Option	Not at all Mildly Significantly Severely
How much did the flood spread pollutants throughout the environment?	Floods can spread pollutants such as sewage, bacteria, pesticides and other chemicals, which can contaminate environments.	Option	Not at all Mildly Significantly Severely

Question	Guidance notes	Question type	Answer options
How long is it expected to take before the environment is restored to its pre-flood state?		Option	<ul style="list-style-type: none"> – No contamination – Recovery will be quick and require some minimal human intervention – Recovery will take some time and require significant human intervention – The natural environment will take longer than a year to recover, or is not expected to recover at all
Please describe the impacts of the flood on the environment.		Text	



Raised tube wells reduce the risk of drinking water being contaminated during a flood © Archana Gurung, Practical Action

Indicator O11: Post-event illness

Revealed resilience: Indirect impact

Context: Community level

Theme: Life and health

Definition: This outcome variable relates to illness which can be a devastating flow-on impact in the post-event recovery period, specifically water or vector borne disease that are spread by stagnant flood water, consumption of water made unsafe due to the flood, or poor hygiene in the post-event period. A resilient community understands and plans for preventing outbreaks of post-event illness.

Notes: Assess whether the community experienced outbreaks – higher than normal incidences – of water and vector borne disease in the 3 months following the flood. Also assess the response from community members and/or health providers, and whether the outbreak(s) resulted in more fatalities from these illnesses than are experienced in normal times.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Prevalence of illness (water and vector borne disease) in the three months following the flood did not increase compared to normal times.	Prevalence of illness (water and vector borne disease) in the three months following the flood increased compared to normal times. <i>and</i> Response was swift and effective. <i>and</i> No more fatalities than in normal times.	Prevalence of illness (water and vector borne disease) in the three months following the flood increased compared to normal times. <i>and</i> Response was slow and/or ineffective. <i>and</i> No more fatalities from these illnesses than in normal times.	Prevalence of illness (water and vector borne disease) in the three months following the flood increased compared to normal times. <i>and</i> Response was slow and/or ineffective. <i>and</i> The community experienced more fatalities from these illnesses than in normal times.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>Which illnesses did the community experience higher than normal incidence (outbreaks) of in the 3 months following the flood?</p> <p>Please tick all options that apply.</p>	<p>Infectious diseases are caused by organisms such as bacteria, viruses, fungi or parasites. Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. Others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.</p> <p>Infectious diseases may or may not be present in the community during normal (non-flood) times, but a flood can result in an outbreak. An outbreak is when lots more people than normal get the infectious illness in a short period of time.</p> <p>Leptospirosis is also known as Weir’s disease, Canicola fever, Hemorrhagic jaundice, Mud fever, and Swineherd disease.</p>	Multi	<ul style="list-style-type: none"> – Diarrhea – Typhoid fever – Cholera – Leptospirosis – Hepatitis A – Malaria – Dengue and/or dengue hemorrhagic fever – Yellow fever – West Nile Fever – Other serious infectious illness – None
<p>How did community members and/or health providers respond to disease outbreaks?</p>	<p>Infectious diseases are caused by organisms such as bacteria, viruses, fungi or parasites. Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. Others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.</p>	Option	<ul style="list-style-type: none"> – There were no outbreaks Community members and/or health services responded quickly and effectively to prevent the spread of the illness(es) – Community members and/or health services responded too slowly or ineffectively to prevent the spread of the illness (es)
<p>Compared to how many people lose their lives from these illnesses in non-flood times, how many extra people lost their life because of these illnesses in the 3 months following the flood?</p>	<p>Infectious diseases may or may not be present in the community during normal (non-flood) times, but a flood can result in an outbreak. An outbreak is when lots more people than normal get the infectious illness in a short period of time.</p>	Numeric	

Question	Guidance notes	Question type	Answer options
<p>Which groups in the community caught the illnesses most? Please tick all options that apply.</p>	<p>Infectious diseases are caused by organisms such as bacteria, viruses, fungi or parasites. Some infectious diseases can be passed from person to person. Some are transmitted by bites from insects or animals. Others are acquired by ingesting contaminated food or water or being exposed to organisms in the environment.</p> <p>Infectious diseases may or may not be present in the community during normal (non-flood) times, but a flood can result in an outbreak. An outbreak is when lots more people than normal get the infectious illness in a short period of time.</p>	Multi	<ul style="list-style-type: none"> – No dominant group – Children – Elderly – Women – Men – Poorer people – Richer people – People with physical or intellectual disabilities – Other – No outbreaks



FRMC baseline study in Las Nieves, Mexico © Paulo Cerino, Mexico Red Cross

Indicator O12: Flood healthcare continuity

Revealed resilience: Indirect impact

Context: Indirect impact

Theme: Life and Health

Definition: This outcome variable relates to the continued provision of healthcare services during and following the flood event. In a resilient community, the provision of healthcare services is not impeded by the flood.

Notes: Assess the community's access to healthcare services during and in the three months following the flood. Consider healthcare services for 'normal' healthcare, as well as healthcare needs resulting from the flood itself i.e. injuries or post-event illness. If the physical location of the healthcare service is affected by the flood but services are provided in an alternative location, then it is still possible for them to meet the needs of the community. Disruptions to access might be due to flooding of the clinic/hospital, flooding of access routes, the healthcare service being overwhelmed with people with flood injuries or waterborne disease, lack of necessary medicines, equipment or staff, or community members may not be able to access healthcare because it is prohibitively expensive. Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
In the three months following the flood event, all community members had access to healthcare services that met their needs with no disruptions to access due to the flood.	In the three months following the flood event, all community members had access to healthcare services that met their needs, with minor disruptions due to the flood. <i>and</i> Disruptions to access did not result in any fatalities or serious injuries.	In the three months following the flood event, community members had limited access to healthcare services, with major disruptions to access due to the flood. <i>and</i> Disruptions to access did not result in any fatalities or serious injuries.	In the three months following the flood event, community members had little or no healthcare services, with major disruptions due to the flood. <i>or</i> Disruptions to access resulted in fatalities or serious injuries. <i>or</i> Community members do not have adequate access to basic healthcare services in normal times.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>How was the community's access to health services affected by the flood? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Health service access was unaffected by the flood. – Health services were disrupted because clinic/hospital was damaged or destroyed by flood. – Health service access was disrupted because roads were blocked. – Health services were disrupted because they were overwhelmed by the number of people needing assistance because of the flood. – Health services were disrupted because the flood caused disruptions in the delivery of medicines, equipment or staff. – The community does not have access to basic healthcare services in normal times because there are not any or community members cannot afford it.
<p>How severe was the disruption to health services due to the flood?</p>		Option	<ul style="list-style-type: none"> – Health service access was unaffected by the flood. Community members could still meet their basic needs because disruptions were minor and/or well handled. – Some community members were unable to meet their basic needs because disruptions were major and/or poorly handled. – Community members had little or no health service access because disruptions were major and/or poorly handled. – The community does not have access to basic healthcare services in normal times because there are not any or community members cannot afford it.

Question	Guidance notes	Question type	Answer options
Did disruptions to health service access result in any fatalities or serious injuries?	Serious injuries include: permanent impairment or loss of a body function; permanent serious disfigurement; permanent severe mental or permanent severe behavioural disturbance or disorder and those that result in a miscarriage.	Option	<ul style="list-style-type: none"> – Yes – No – Don't know
Please provide a short description of the impact of the flood on the community's health services	Consider healthcare services for 'normal' healthcare, as well as healthcare needs resulting from the flood itself i.e. injuries or post-event illness. If the physical location of the healthcare service is affected by the flood but services are provided in an alternative location, then it is still possible for them to meet the needs of the community.	Text	



Humanitarian support during flash flood in Lima, Peru © Practical Action

Indicator O13: Continuity of education

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Livelihoods

Definition: This outcome variable relates to the continued provision of education for child and adolescent students during and following the flood event. In a resilient community, the provision of education for is not interrupted by the flood.

Notes: If school(s) are flooded or inaccessible, but education is provided at alternative locations, this is considered to be continued provision of education. Interruption of education may be caused by flooding at schools, flooding of access routes, the school being used as an evacuation centre or for other purposes, teachers being unable to access the community, students being in evacuation centres which do not provide education, or students not being able to attend school. If the flood occurs during normal school holidays but classes resume at the normal time, then it is considered not to have interrupted education. If some individual students miss school because of a flood related injury, this should not influence grading – focus on issues which affect groups of students.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>Education for less than 5% of students is interrupted due to the flood.</p> <p><i>and</i></p> <p>No students drop out of school due to the consequences of the flood.</p>	<p>Education for more than 5% of students is interrupted for 1-5 days due to flood.</p> <p><i>and</i></p> <p>No students drop out of school due to the consequences of the flood.</p>	<p>Education for more than 5% of students is interrupted for 1-4 weeks due to flood.</p> <p><i>and</i></p> <p>No students drop out of school due to the consequences of the flood.</p>	<p>Education for more than 5% of students is interrupted for more than 4 weeks.</p> <p><i>or</i></p> <p>Any students dropped out of school due to the consequences of the flood.</p> <p><i>or</i></p> <p>The majority of children and adolescents in this community do not attend school in normal times.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What percentage of students in this community attend school in normal times?		Percent	
What percentage of boy students missed school for 1-4 weeks due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	
What percentage of girl students missed school for more than 4 weeks due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	
What percentage of boy students missed school for more than 4 weeks due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	
Please describe the impact of the flood on the education of children and adolescents, girls and boys.		Text	
For any schools where students from the community attend, what was the longest time classes were not running for because of the flood?	If school(s) are flooded or inaccessible, but education is provided at alternative locations, this is considered to be continued provision of education.	Numeric	

Question	Guidance notes	Question type	Answer options
<p>What were the reasons classes were not running? Please tick all options that apply.</p>	<p>If school(s) are flooded or inaccessible, but education is provided at alternative locations, this is considered to be continued provision of education. If the flood occurs during normal school holidays but classes resume at the normal time, then it is considered not to have interrupted education.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – Not applicable – classes were running – School buildings were damaged or destroyed by the flood – Routes to schools were blocked – The school was being used for another purpose i.e. evacuation centre – Staff/teachers did not attend – Schools were closed by authorities – Other reason – Flood occurred during the holidays – The majority of students in this community do not attend school in normal times
<p>If classes were running but students still missed school, why did they miss it? Please tick all options that apply.</p>	<p>If the flood occurs during normal school holidays but classes resume at the normal time, then it is considered not to have interrupted education. Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – Not applicable – students did not miss school – Not applicable – classes were not running because of the flood – Routes to schools were blocked – School bus or public transportation was not running – Students were in evacuation centres and classes were not provided – Students needed to help at home – Students needed to work/earn money because of economic impacts from the flood – Families considered it unsafe to send children to school during the flood – Other reason – Flood occurred during the holidays – The majority of students in this community do not attend school in normal times
<p>What percentage of girl students dropped out of school because of the impacts of the flood?</p>		<p>Percent</p>	

Question	Guidance notes	Question type	Answer options
What percentage of boy students dropped out of school because of the impacts of the flood?		Percent	
What percentage of girl students missed school for 1-5 days due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	
What percentage of boy students missed school for 1-5 days due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	
What percentage of girl students missed school for 1-4 weeks due to the flood?	Individual students who miss school because of a flood related injury should not be counted – focus on issues which affect groups of students.	Percent	



Children in school that also serves as a community evacuation centre during floods © Archana Gurung, Practical Action

Indicator O14: Household income stability

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Livelihoods

Definition: This outcome variable shows the strength of the community’s income levels after a flood event. In a resilient community, income is not affected by the flood, or increases.

Notes: Income is the amount of cash coming into a household on a regular basis, not what the household uses this income for. If normal sources of income are affected by the flood but are replaced with alternative sources of income (alternative livelihoods or jobs, income from government welfare, an NGO, insurance payments, money from family etc.), then this is considered a resilient outcome and not an interruption to income. Consider income in the months following the flood event, as well as the impact the flood is likely to have on income for the year following the flood event.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>The flood had a negative impact on income for less than 5% of households.</p> <p><i>and</i></p> <p>No community members were unable to meet their basic needs due to lack of income caused by the flood.</p>	<p>The flood had negative impacts on more than 5% of a households’ income, but economic recovery to pre-flood income levels occurred within three months.</p> <p><i>and</i></p> <p>No community members were unable to meet their basic needs due to lack of income caused by the flood.</p>	<p>The flood had negative impacts on more than 5% of a household’s income, and economic recovery to pre-flood income levels will take between 3-12 months.</p> <p><i>and</i></p> <p>No community members were unable to meet their basic needs due to lack of income caused by the flood.</p>	<p>The flood had negative impacts on more than 5% of a household’s income, economic recovery is very slow and some may never recover.</p> <p><i>or</i></p> <p>Some community members have been or will be unable to meet their basic needs due to lack of income caused by the flood.</p> <p><i>or</i></p> <p>More than 20% of community members do not meet their basic needs due to lack of income in normal times.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What percentage of households are unable to meet their basic needs due to lack of income in normal times?</p>	<p>Income to meet basic needs means enough income to meet the household's basic needs for food (including water), shelter and clothing.</p>	<p>Percent</p>	
<p>What percentage of households have been or will likely be unable to meet their basic needs for any period of time because of the impact of floods on their income?</p>	<p>Here we are measuring income – how much money is coming into a household – not whether the household has extra expenses due to the flood. If income drops because a community member cannot work, but it is replaced by increased income from another community member such as, taking a job, government welfare, an NGO, insurance payments, money from family etc., then there was no reduction in income for the household. Income to meet basic needs means enough income to meet the household's basic needs for food (including water), shelter and clothing. Consider income in the months following the flood event, as well as the impact the flood is likely to have on income for the year following the flood event. Example 1, if a household loses a main income source and receives NGO support for three months after the flood but this will soon cease, it is likely their income will decrease over the year until a new income source is secured. Example 2, the flood may not have an immediate impact on the income of a farming household, but because the flood destroyed their crops it will severely affect their income for the coming season. For households without cash income, for example subsistence farmers, the flood has no negative impacts on their income.</p>	<p>Percent</p>	
<p>For what percentage of households did the flood cause a negative impact on income that will be recovered within 3 months?</p>	<p>Here we are measuring income – how much money is coming into a household – not whether the household has extra expenses due to the flood. If income drops because a community member cannot work, but it is replaced by increased income from another community member such as, taking a job, government welfare, an NGO, insurance payments, money from family etc., then there was no reduction in income for the household. Income to meet basic needs means enough income to meet the household's basic needs for food (including water), shelter and clothing. Consider income in the months following the flood event, as well as the impact the flood is likely to have on income for the year following the flood event. Example 1, if a household loses a main income source and receives NGO support for three months after the flood but this will soon cease, it is likely their income will decrease over the year until a new income source is secured. Example 2, the flood may not have an immediate impact on the income of a farming household, but because the flood destroyed their crops it will severely affect their income for the coming season. For households without cash income, for example subsistence farmers, the flood has no negative impacts on their income.</p>	<p>Percent</p>	

Question	Guidance notes	Question type	Answer options
<p>For what percentage of households did the flood cause a negative impact on income that will be recovered between 3-12 months?</p>	<p>Here we are measuring income – how much money is coming into a household – not whether the household has extra expenses due to the flood. If income drops because a community member cannot work, but it is replaced by increased income from another community member such as, taking a job, government welfare, an NGO, insurance payments, money from family etc., then there was no reduction in income for the household. Income to meet basic needs means enough income to meet the household’s basic needs for food (including water), shelter and clothing. Consider income in the months following the flood event, as well as the impact the flood is likely to have on income for the year following the flood event. Example 1, if a household loses a main income source and receives NGO support for three months after the flood but this will soon cease, it is likely their income will decrease over the year until a new income source is secured. Example 2, the flood may not have an immediate impact on the income of a farming household, but because the flood destroyed their crops it will severely affect their income for the coming season. For households without cash income, for example subsistence farmers, the flood has no negative impacts on their income.</p>	<p>Percent</p>	
<p>For what percentage of households did the flood cause a negative impact on income that will take longer than 12 months to recover, or may not recover at all?</p>	<p>Here we are measuring income – how much money is coming into a household – not whether the household has extra expenses due to the flood. If income drops because a community member cannot work, but it is replaced by increased income from another community member such as, taking a job, government welfare, an NGO, insurance payments, money from family etc., then there was no reduction in income for the household. Income to meet basic needs means enough income to meet the household’s basic needs for food (including water), shelter and clothing. Consider income in the months following the flood event, as well as the impact the flood is likely to have on income for the year following the flood event. Example 1, if a household loses a main income source and receives NGO support for three months after the flood but this will soon cease, it is likely their income will decrease over the year until a new income source is secured. Example 2, the flood may not have an immediate impact on the income of a farming household, but because the flood destroyed their crops it will severely affect their income for the coming season. For households without cash income, for example subsistence farmers, the flood has no negative impacts on their income.</p>	<p>Percent</p>	

Indicator O15: Food security

Revealed resilience: Indirect impact

Context: Community Level

Theme: Life and Health

Definition: This outcome variable is concerned with whether the flood has impacted food security (quantity and quality of food), which is essential to wellbeing. In a resilient community, both calorie intake and nourishment from good quality, varied food would not be interrupted by the flood.

Notes: Calorie intake is the amount of food consumed and is usually largely met by staples such as rice, maize/corn, wheat, potato, cassava, soybeans, sorghum and other locally important staples. Nourishment comes from eating a wide variety of nutritious foods such as vegetables, fruits, lentils/pulses/beans, eggs, dairy, and seafood, fish and meats. Impacts on food security can be caused because of insufficient and/or low quality food available in evacuation centres, the flood destroyed local food supply (crops, animals or stores of food), people were unable to reach farmland or markets, or the flood caused food price increases.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>The flood had negative impacts on less than 5% of community member's calorie intake.</p> <p><i>and</i></p> <p>The flood had negative impacts on less than 5% of community member's nourishment (variety of accessible food).</p>	<p>The flood had negative impacts on less than 5% of community member's calorie intake.</p> <p><i>and</i></p> <p>The flood had negative impacts on more than 5% of community member's nourishment (variety of accessible food) for less than one month.</p>	<p>The flood had negative impacts on more than 5% of community member's calorie intake for less than one month.</p> <p><i>or</i></p> <p>The flood had negative impacts on more than 5% of community member's nourishment (variety of accessible food) for more than one month.</p>	<p>The flood had negative impacts on more than 5% of community member's calorie intake for more than one month.</p> <p><i>or</i></p> <p>More than 5% of community members do not meet their basic calorie intake needs in normal times.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What percentage of the community regularly go to bed hungry in normal times?</p>		Percent	

Question	Guidance notes	Question type	Answer options
<p>How did the flood impact the community's consumption of food? Please tick all options that apply.</p>	<p>Both calorie intake and nourishment from good quality, varied food is important for humans. People tend to fill up with staples such as rice, maize/corn, wheat, potato, cassava, soybeans, sorghum etc. They then get additional nourishment from a variety of nutritious foods such as vegetables, fruits, lentils/pulses/beans, eggs, dairy, and seafood, fish and meats.</p>	Multi	<ul style="list-style-type: none"> – It did not impact food consumption – The flood damaged food producers (i.e. farms) – The flood destroyed local grain stores – People were unable to reach farmland or markets – Food prices increased significantly – The flood reduced incomes so people could not afford to buy food – Not enough food in evacuation centres – Other reasons
<p>What percentage of the community went to bed hungry because of the flood, for less than one month?</p>		Percent	
<p>What percentage of the community went to bed hungry because of the flood, for more than one month?</p>		Percent	
<p>What percentage of the community did not have enough nourishment (variety of nutritious foods) because of the flood, for less than one month?</p>		Percent	
<p>What percentage of the community did not have enough nourishment (variety of nutritious foods) because of the flood, for more than one month?</p>		Percent	

Question	Guidance notes	Question type	Answer options
<p>Please provide a short description of the impact of the flood on the community's consumption of food.</p>	<p>Both calorie intake and nourishment from good quality, varied food is important for humans.</p> <p>People tend to fill up with staples such as rice, maize/corn, wheat, potato, cassava, soybeans, sorghum etc. They then get additional nourishment from a variety of nutritious foods such as vegetables, fruits, lentils/pulses/beans, eggs, dairy, and seafood, fish and meats.</p>	Text	



Woman in her vegetable farm © Archana Gurung, Practical Action

Indicator O16: Communications performance

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Lifelines

Definition: This outcome variable is concerned with the impact of the floods on key means of communications, and if communications were quickly repaired. Communications are critical for accessing information about the flood and aiding recovery.

Notes: Assess the impact of the flood on the typical communication means in the community (who, frequency, purpose and infrastructure used); personnel availability; services provided (service provider and maintenance). Interruptions to communications may be via flooding of infrastructure (sender, transmitter, receiver) such as cellphone towers or radio transmitters flooded and out of service, or users being unable to use their devices. Consider whether alternatives or backups were activated during and after flooding. Assess also whether the communication channels coped with the increased demand / load that may have been put onto the system during and after crises.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Key communication means remained functional, reliable and accessible to all community members during and after the flood. Note: small interruptions in noncritical and non-threatening areas are acceptable.	Key communication means remained generally functional during and after the flood, or were quickly restored or substituted via the implementation of contingency plans. Limited interruptions occurred however they did not undermine the overall ability of the community to communicate internally and externally.	Key communication means were interrupted, restricting the ability of the community to communicate internally and externally. However interruptions were not so substantial, or were repaired or substituted quickly enough, that essential communication was maintained.	Key communication means were severely interrupted during and after the flood, undermining the functionality of the community to communicate internally and externally. or There are no functioning communication systems present in the community.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What communications means are used widely in the community in normal times? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Mobile phone – Landline phone – Radio – TV – Internet – Newspaper – Local discussions – Other – None
<p>Which key communication means did not operate normally during the flood event? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Mobile phone – Landline phone – Radio – TV – Internet – Newspaper – Local discussions – Other – None

Question	Guidance notes	Question type	Answer options
<p>What was the impact of disruptions to communication means?</p>	<p>Interruptions to communications may be via flooding of infrastructure (sender, transmitter, receiver) such as cellphone towers or radio transmitters flooded and out of service, or users being unable to use their devices. Consider whether alternatives or backups were activated during and after flooding. Assess also whether the communication channels coped with the increased demand / load that may have been put onto the system during and after crises.</p>	<p>Option</p>	<ul style="list-style-type: none"> – Communication means in the community were not disrupted – Disruptions were limited and did not stop internal or external communications – Disruptions were substantial, however essential communication was maintained – Disruptions were severe, the community could not communicate internally or externally – There are no communication systems present in the community.
<p>Please describe the impacts of the flood on key communication means.</p>	<p>Interruptions to communications may be via flooding of infrastructure (sender, transmitter, receiver) such as cellphone towers or radio transmitters flooded and out of service, or users being unable to use their devices. Consider whether alternatives or backups were activated during and after flooding. Assess also whether the communication channels coped with the increased demand / load that may have been put onto the system during and after crises.</p>	<p>Text</p>	

Indicator O17: Transportation performance

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Lifelines

Definition: This outcome variable is concerned with the impact of the floods on road and public transportation infrastructure, whether there are alternative, non-damaged routes, and if infrastructure is quickly repaired. Road and public transportation access is critical for responding to flood events, recovery, and getting community life back to normal.

Notes: Assess the impact of the flood on the typical modes of travel in the community (who, frequency, structures such as roads and vehicles); personnel availability; services provided (public transport). Interruptions due to floods may be impacts such as roads and rails that become impassable or unsafe to use during flooding, bridges and other structures that fail or get damaged. Consider whether the flood hampered infrastructure such that evacuation was hampered. Also consider whether alternatives for transport interruptions were put in place during and after flooding.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Key transportation links remained functional, reliable and accessible to all community members during and after floods. Note: Small interruptions in non-critical and non-threatening areas are acceptable.	Key transportation links remained generally functional during and after the flood, or were quickly restored or substituted via the implementation of contingency plans. Limited interruptions occurred however they did not undermine the overall accessibility of the main areas of the community.	Key transportation links were hampered, restricting access to/from or within the community. However interruptions were not so substantial, or were repaired or substituted quickly enough, that the community was not entirely cut off.	Key transportation links were hampered such that the community was cut off. <i>or</i> There are no functioning transport systems present in the community.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What transportation means are used widely in the community in normal times? Please tick all options that apply.		Multi	<ul style="list-style-type: none"> – Paths for walking – human and animal – Road transport – private vehicles – Road transport – public transport – Bridges – Water transport – Rail – Tram cars or light rail – Other

Question	Guidance notes	Question type	Answer options
<p>Which key transport means did not operate normally during the flood event? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Paths for walking – human and animal – Road transport – private vehicles – Road transport – public transport – Bridges – Water transport – Rail – Tram cars or light rail – Other – None
<p>What was the impact of disruptions to transport means?</p>	<p>Interruptions due to floods may be impacts such as roads and rails that become impassable or unsafe to use during flooding, bridges and other structures that fail or get damaged. Consider whether the flood hampered infrastructure such that evacuation was hampered. Also consider whether alternatives for transport interruptions were put in place during and after flooding.</p>	Option	<ul style="list-style-type: none"> – Transport means in the community were not disrupted – Disruptions were limited and did not undermine the overall accessibility of the main areas of the community – Disruptions were substantial, however the community was not entirely cut off – Disruptions were severe, the community was cut off – There are no transport means except paths for walking in this community
<p>Please describe the impacts of the flood on key transport means.</p>	<p>Interruptions due to floods may be impacts such as roads and rails that become impassable or unsafe to use during flooding, bridges and other structures that fail or get damaged. Consider whether the flood hampered infrastructure such that evacuation was hampered. Also consider whether alternatives for transport interruptions were put in place during and after flooding.</p>	Text	

Indicator O18: Safe water

Revealed resilience: Indirect impact

Context: Community Level

Theme: Life and Health

Definition: This outcome variable is concerned with whether the flood has impacted community access to safe drinking and service water (non-drinkable water for household and livelihood use). In a resilient community, members would be able to maintain access to safe water.

Notes: Assess the impact of the flood on the community's access to safe drinkable and service water. Interruptions to safe water access may be caused by flood waters depositing sediment or contamination in the water supply system (storage, pipes etc.) or interruption of transport access for clean water delivery. If interruptions to normal supply occur but are compensated via the widespread use of water purification (boiling, tablets etc.) this is a resilient outcome.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>The flood had no negative impacts on the community's access to drinking water to meet community member's needs.</p> <p><i>and</i></p> <p>The flood had no negative impacts on the community's access to safe service water.</p>	<p>The flood had no negative impacts on the community's access to drinking water to meet community member's needs.</p> <p><i>and</i></p> <p>The flood had some negative impacts on the community's access to safe service water, however this was restored in less than one month.</p>	<p>The flood had negative impacts on the community's access to drinking water to meet community member's needs, however this was restored in less than one week.</p> <p><i>and</i></p> <p>The flood had negative impacts on the community's access to safe service water, however this was restored in less than one month.</p>	<p>The flood had negative impacts on the community's access to drinkable water to meet community member's needs, which took longer than one week to be restored.</p> <p><i>or</i></p> <p>The flood had some negative impacts on the community's access to safe service water, which took longer than one month to be restored.</p> <p><i>or</i></p> <p>The community does not have access to a reliable supply of drinkable water in normal times.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What are the key means of access to safe drinking water in the community in normal times? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Piped water – Well water – Open water source (river, lake) if habitually treated – Water truck or other remote services – The community does not have ready access to drinkable water in normal times
<p>For how long after the flood was the community's access to drinkable water disrupted?</p>	<p>Interruptions to safe water access may be caused by flood waters depositing sediment or contamination in the water supply system (storage, pipes etc.) or interruption of transport access for clean water delivery. If interruptions to normal supply occur but are compensated via the widespread use of water purification (boiling, tablets etc.) this is a resilient outcome.</p>	Option	<ul style="list-style-type: none"> – No disruption – Less than one week – Between one week and one month – More than one month – The community does not have ready access to drinkable water in normal times
<p>What are the key means of access to safe service water in the community in normal times? Please tick all options that apply.</p>		Multi	<ul style="list-style-type: none"> – Piped water – Well water – Open water source (river, lake) – Water truck or other remote services – The community does not have ready access to safe service water in normal times
<p>Please describe the impact of the floods on the community's access to safe drinking and service water.</p>	<p>Service water is non-drinkable water for household and livelihood use. Interruptions to safe water access may be caused by flood waters depositing sediment or contamination in the water supply system (storage, pipes etc.) or interruption of transport access for clean water delivery. If interruptions to normal supply occur but are compensated via the widespread use of water purification (boiling, tablets etc.) this is a resilient outcome.</p>	Text	

Indicator O19: Waste management performance

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Natural Environment

Definition: This outcome variable is concerned with the impact of the flood on the community’s waste management systems, and resulting impacts on community members’ health. In a resilient community, the flood would not cause any breakdowns in the waste management system such that waste (waste water and garbage) contaminated the community environment and impact people’s health.

Notes: Assess the impact of the flood on the functioning of (formal and informal) waste management systems, as well as whether flood waters (and associated debris) contaminated the community or surrounding environment. Consider the impact of the flood on both ends of the waste management system – what households and businesses do with waste, and where waste ends up. Consider both formal and informal waste management systems – formal systems may be government garbage collection, informal systems may be a local waste disposal area, burning etc.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Waste management systems and waste disposal sites remained fully operational during and after floods and did not cause contamination or health issues.	Waste management systems and waste disposal sites remained generally functional, with minimal disruption and contamination. No significant health issues or major clean-up issues.	Waste management systems were significantly impacted with large disruption and contamination consequences for health or clean-up. <i>or</i> Waste disposal sites were significantly impacted with large disruption and contamination consequences for health or clean-up.	Waste management systems were significantly impacted with large disruption and contamination consequences for health or clean-up. <i>and</i> Waste disposal sites were significantly impacted with large disruption and contamination consequences for health or clean-up. <i>or</i> The community does not have effective formal or informal waste management systems in normal times.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
Please describe the community's waste management system – how household and other waste is removed and processed.	Consider both ends of the waste management system – what households and businesses do with waste, and where waste ends up. Consider both formal and informal waste management systems – formal systems may be government garbage collection, informal systems may be a local waste disposal area, burning etc.	Text	
How severely was the community's waste management system affected by the flood?	Consider the impact of the flood on both ends of the waste management system – what households and businesses do with waste, and where waste ends up. Consider both formal and informal waste management systems – formal systems may be government garbage collection, informal systems may be a local waste disposal area, burning etc.	Option	<ul style="list-style-type: none"> – Waste management systems were not impacted by the flood – Waste management systems were disrupted but remained generally functional – Waste management systems were significantly disrupted – Waste management systems were severely disrupted – The community does not have a functioning waste management system in normal
Did the flood's impact on waste management systems have negative impacts on human health?		Option	<ul style="list-style-type: none"> – Yes – No – Don't know
Did the flood's impact on waste management systems result in major clean-up issues?		Option	<ul style="list-style-type: none"> – Yes – No – Don't know
Please describe the impact of the flood on the community's waste management systems	Consider the impact of the flood on both ends of the waste management system – what households and businesses do with waste, and where waste ends up. Consider both formal and informal waste management systems – formal systems may be government garbage collection, informal systems may be a local waste disposal area, burning etc.	Text	

Indicator O20: Continuity of energy and fuel supply

Revealed resilience: Indirect impact

Context: Enabling Environment

Theme: Lifelines

Definition: This outcome variable is concerned with the energy supply in the community and whether it is disrupted by floods. In a resilient community, the flood would not cause any breakdowns in the availability of energy and fuel.

Notes: Assess the impact of the flood on energy and fuel supply. Consider how the energy and fuel supply functioned during the flood – assess whether there were interruptions to services, reliability, quality and accessibility. Energy and fuel may come in different forms – electricity, gas and firewood for cooking and heating, as well as fuel for transportation and machinery. Some substitution to meet basic needs is acceptable.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
The flood had no negative impacts on the community’s energy and fuel supply systems.	The flood had negative impacts on the community’s energy and fuel supply systems, however they were repaired or substituted for quickly and did not impede overall community functioning.	The flood had severe negative impacts on the community’s energy and fuel supply systems. Alternative, ad-hoc supplies provided energy/fuel for meeting basic needs.	The flood had severe negative impacts on the community’s energy and fuel supply systems, severely hampering community member’s ability to meet their basic needs. <i>or</i> The community does not have reliable access to energy and fuel for meeting basic needs in normal times.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What key energy and fuel supplies does the community use in normal times? Please tick all options that apply.</p>	<p>Energy and fuel may come in different forms – electricity, gas and firewood for cooking and heating, as well as fuel for transportation and machinery.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – Electricity via power lines – Electricity via small scale power generators – Electricity via local source such as solar arrays – Plumbed gas power – Firewood – Biofuels – Vehicle and machinery operation via liquid fuel – Other – The community does not have access to energy and fuel supplies to meet basic needs in normal times
<p>Which key energy and fuel supplies did not operate normally during the flood event? Please tick all options that apply.</p>	<p>Energy and fuel may come in different forms – electricity, gas and firewood for cooking and heating, as well as fuel for transportation and machinery.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – Electricity via power lines – Electricity via small scale power generators – Electricity via local source such as solar arrays – Plumbed gas power – Firewood – Biofuels – Vehicle and machinery operation via liquid fuel – Other

Question	Guidance notes	Question type	Answer options
<p>What was the impact of disruptions to energy and fuel supplies?</p>	<p>Consider how the energy and fuel supply functioned during the flood – assess whether there were interruptions to services, reliability, quality and accessibility. Energy and fuel may come in different forms – electricity, gas and firewood for cooking and heating, as well as fuel for transportation and machinery. Some substitution to meet basic needs is acceptable.</p>	<p>Option</p>	<ul style="list-style-type: none"> – Energy and fuel supplies in the community were not disrupted – Energy and fuel supplies were disrupted but this did not impede overall community functioning – Energy and fuel supplies were severely disrupted but the community continued to meet basic needs – Energy and fuel supplies were severely disrupted and this severely hampered community members’ ability to meet basic needs – The community does not have reliable access to energy and fuel for meeting basic needs in normal times
<p>Please describe the impacts of the flood on the community’s energy and fuel supplies.</p>	<p>Consider how the energy and fuel supply functioned during the flood – assess whether there were interruptions to services, reliability, quality and accessibility. Energy and fuel may come in different forms – electricity, gas and firewood for cooking and heating, as well as fuel for transportation and machinery. Some substitution to meet basic needs is acceptable.</p>	<p>Text</p>	

Indicator O21: Property crime

Revealed resilience: Indirect impact

Context: Community Level

Theme: Social Norms

Definition: This outcome variable is concerned with the prevalence of property theft and looting during and following the flood, as compared to normal times.

Notes: Assess whether property crime and looting increased during and following the flood. Property crime is the theft or intentional damage/vandalization of property such as homes and their contents, vehicles, public amenities, and other property.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Levels of property theft stayed the same as non-flood times. <i>and</i> There was no looting during or after the flood.	Levels of property theft increased slightly compared to non-flood times, however law enforcement response was swift and effective. <i>and</i> There was no looting during or after the flood.	Levels of property theft increased substantially compared to non-flood times. <i>or</i> Looting occurred during and following the flood.	Levels of property theft increased substantially compared to non-flood times. <i>and</i> Looting occurred during and following the flood.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
Compared to normal times, did theft of community member's property increase during and following the flood?	Consider theft of home and business contents, vehicles, equipment, etc. Perpetrators may be from within or outside the community.	Option	<ul style="list-style-type: none"> – Theft did not increase compared to normal times – Theft increased slightly but the response from law enforcement was quick and effective – Theft increased Theft increase significantly.
Were any homes, businesses or other buildings looted during or soon after the flood event?	Looting is violent theft and vandalization of shops, during a crisis event when owners/ staff are absent and/or law enforcement is unable to respond. Looters may come from within or outside the community	Option	<ul style="list-style-type: none"> – Yes – No – Don't know

Question	Guidance notes	Question type	Answer options
Please describe the theft and looting situation during and following the floods.		Text	



River Thur flooding in 2013, Switzerland © Michael Szönyi, Zurich Insurance Group

Indicator O22: Learning from flood

Revealed resilience: Action

Context: Community Level

Theme: Governance

Definition: This outcome variable is concerned with whether the community is reflecting and learning from the flood, and putting those lessons into practice to reduce flood risk in the future by making changes to flood risk management. A resilient community is one that learns from past experiences and takes action in response to that learning.

Notes: Assess whether the community is undertaking an active process to understand the flood and its impacts so that they can reduce flood risk and plan for the next flood. Whether or not the community is reflecting on the flood can be seen in whether there have been any reports on the flood produced and distributed, or more informally whether there have been community discussions reflecting on what happened and what could be done better next time. Whether or not the community is enhancing their planning for the next flood might be seen in discussions about changing laws or regulations (formal or informal), the formation or enhancement of disaster risk management bodies, or physical works to reduce flood risk.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>The community has undertaken or is undertaking an in-depth process to fully understand the causes and impacts of the flood in order to reduce risk in the future.</p> <p><i>and</i></p> <p>The community is in the process of enhancing its flood risk management process and is taking action to reduce flood risk.</p>	<p>The community has undertaken or is undertaking a sound process to gain a solid understanding of the causes and impacts of the flood in order to reduce risk in the future.</p> <p><i>and</i></p> <p>The community is considering how to improve flood risk management and/or reduce flood risk.</p>	<p>The community has undertaken or is undertaking a limited process to gain a cursory understanding of the causes and impacts of the flood in order to reduce risk in the future.</p>	<p>The community has not taken or initiated any action to understand the causes and impacts of the flood in order to reduce risk in the future.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>What actions has the community taken to understand the causes and impacts of the flood?</p>	<p>Describe what actions the community is undertaking to understand the flood and its impacts so that they can reduce flood risk and plan for the next flood. Whether or not the community is reflecting on the flood can be seen in whether there have been any reports on the flood produced and distributed, or more informally whether there have been community discussions reflecting on what happened and what could be done better next time.</p>	<p>Text</p>	
<p>How strong is the community's interest and investment (within their means) in understanding the causes and impacts of the flood?</p>		<p>Option</p>	<ul style="list-style-type: none"> – The community has undertaken or is undertaking an in-depth process to fully understand the causes and impacts of the flood. – The community has undertaken or is undertaking a sound process to gain a solid understanding of the causes and impacts of the flood – The community has undertaken or is undertaking a limited process to gain a cursory understanding of the causes and impacts of the flood – The community has not taken or initiated any action to understand the causes and impacts of the flood.
<p>Has the community's understanding of the causes and impacts of the flood resulted in any changes or enhancements to flood risk management?</p>	<p>Whether or not the community is enhancing their planning for the next flood might be seen in discussions about changing laws or regulations (formal or informal), the formation or enhancement of disaster risk management bodies, or physical works to reduce flood risk.</p>	<p>Option</p>	<ul style="list-style-type: none"> – The community has enhanced its flood risk management process and is taking action to reduce flood risk – The community is considering how to improve flood risk management and/or reduce flood risk – The community is not considering how to improve flood risk management and/or reduce flood risk.

Indicator O23: Early warning system performance

Revealed resilience: Action

Context: Enabling Environment

Theme: Lifelines

Definition: Presence and functionality of an Early Warning System (EWS) to warn the flood-exposed population with an adequate lead time to reach safe grounds with evacuation or protection of most important assets can be essential for saving lives and reducing damaged assets during floods.

Notes: Assess the functioning of the EWS during the flood event. Consider whether there was a warning, whether it reached the community with enough time for them to respond appropriately, whether it reached all community members (either directly or via the message being distributed internally), whether the warning was understood by community members, and whether community members trusted the warning. Both formal and informal EWSs can be assessed. Note that in some cases a few hours warning can significantly reduce flood impact but the actual warning time necessary to lead to adequate action needs to be determined by an analysis of the flood process at hand, and in some contexts an EWS may not be needed or may not provide much benefit.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
There was an early warning system present in the community and it functioned well. All community members received, understood and trusted the warning in enough time to take action.	There was an early warning system present in the community and it functioned reasonably well, although some improvements could be made in ensuring all community members receive, understand and trust the warning, or that it reaches the community in more time.	There was an early warning system present in the community however it functioned poorly. It was only received by some community members, or it was not understood, or it was not trusted, or it came too late to take action.	There was an early warning system present in the community however it did not function at all. <i>or</i> No functional early warning system in place in the community.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>When the flood was imminent, what type of warning information was disseminated to the community?</p>	<p>Consider whether there was a warning, whether it reached the community with enough time for them to respond appropriately, whether it reached all community members (either directly or via the message being distributed internally), whether the warning was understood by community members, and whether community members trusted the warning. Both formal and informal EWSs can be assessed.</p> <p>Note that in some cases a few hours warning can significantly reduce flood impact but the actual warning time necessary to lead to adequate action needs to be determined by an analysis of the flood process at hand, and in some contexts an EWS may not be needed or may not provide much benefit.</p>	<p>Option</p>	<ul style="list-style-type: none"> – The early warning system was activated early enough for people to protect their assets and livelihoods and to stay safe (at home or evacuate) – The early warning system was activated early enough for people to stay safe (at home or evacuate) but time was too short to protect assets and livelihoods – The early warning system was activated but only experts/ authorities received the warnings, community members did not receive warnings to take action – The early warning system was not activated or did not function – There is no early warning system in this community
<p>Was information about the upcoming flood distributed across the community so that all community groups could benefit from it?</p>	<p>Consider whether all groups received the warning, could understand the warning, and knew how to respond to the warning.</p>	<p>Option</p>	<ul style="list-style-type: none"> – Information about the upcoming flood was distributed in such a way that all groups in the community benefited – Information about the upcoming flood only reached some groups in the community – Information about the upcoming flood only reached experts / authorities – Information about the upcoming floods did not reach anyone in the community
<p>Did community members know what to do when they received the early flood warning?</p>		<p>Option</p>	<ul style="list-style-type: none"> – All community members knew what to do with the flood warning – Some but not all community members knew what to do with the flood warning – Only authorities or a small number of community members knew what to do with the flood warning – Community members generally did not know what to do with the flood warning – The community did not receive a flood warning

Question	Guidance notes	Question type	Answer options
<p>Please describe how the early warning system functioned in the community.</p>	<p>Consider whether there was a warning, whether it reached the community with enough time for them to respond appropriately, whether it reached all community members (either directly or via the message being distributed internally), whether the warning was understood by community members, and whether community members trusted the warning. Both formal and informal EWSs can be assessed.</p> <p>Note that in some cases a few hours warning can significantly reduce flood impact but the actual warning time necessary to lead to adequate action needs to be determined by an analysis of the flood process at hand, and in some contexts an EWS may not be needed or may not provide much benefit.</p>	Text	



Early Warning System monitoring station in Lima, Peru © Rodrigo Rodrich

Indicator O24: Mutual support

Revealed resilience: Action

Context: Community Level

Theme: Social Norms

Definition: This outcome variable is concerned with intra-community support – how community members supported each other during and following the flood. A resilient community pulls together in the face of floods to help each other and recover quickly.

Notes: Assess to what extent intra-community support or solidarity in the community was activated to provide mutual support and assistance during and after the flood. Intra-community support or solidarity can be in the form of both formal and informal social networks that facilitate information sharing and the delivery of support and assistance during and after floods.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
Strong formal and informal social networks shared information and provided substantial support and assistance to community members during and after the floods. All community members were part of these networks of mutual support.	Some formal and informal social networks shared information and provided some support and assistance to community members during and after floods. Very few community members were not a part of these networks of mutual support.	Some formal and informal social networks shared some information and provided some limited support and assistance to community members during and after floods. Support was limited and many community members were not part of these networks of mutual support.	No formal or informal social networks were in place to share information or provide support and assistance to community members during and after floods.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
Did formal or informal networks in the community help people support each other during and following the flood?	Intra-community support or solidarity can be in the form of both formal and informal social networks that facilitate information sharing and the delivery of support and assistance during and after floods.	Option	<ul style="list-style-type: none"> – Strong and extensive networks provided support – Some networks provided support – Few networks provided support – No networks provided support

Question	Guidance notes	Question type	Answer options
<p>Were all groups in the community included in social networks for support during and following the flood?</p>		Option	<ul style="list-style-type: none"> – All community members were part of the social networks – Most community members were part of the social networks – A limited number of community members were part of the social networks – No networks provided support
<p>Please describe how community members supported each other, especially vulnerable community members, during and following the flood.</p>	<p>Intra-community support or solidarity can be in the form of both formal and informal social networks that facilitate information sharing and the delivery of support and assistance during and after floods.</p>		<ul style="list-style-type: none"> – Text



Evacuation in progress during mock flood drill in Karnali, Nepal © Archana Gurung , Practical Action

Indicator O25: External support

Revealed resilience: Action

Context: Enabling Environment

Theme: Governance

Definition: This outcome variable is concerned with whether the community received assistance from outside the community (government, NGOs, neighbouring communities etc.) in order to help respond to and recover from floods, and whether this assistance was available to all community members who needed it or only some.

Notes: Consider the gap between what communities could provide for themselves and what they need – ideally this gap should be met by external support. External support may be in the form of emergency services from outside the community, provision of evacuation facilities and resources, and aid (food, materials or money) for meeting basic needs and rebuilding after the flood.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>Extensive external assistance for response and recovery was accessed by all community members who needed it.</p> <p><i>or</i></p> <p>The community did not need additional support to respond and recover from the flood.</p>	<p>External assistance for response and recovery was accessed by most community members who needed it.</p>	<p>Some limited external assistance for response or recovery was accessed by a small proportion of the community.</p>	<p>No external assistance for response or recovery was accessed by the community.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
<p>If the community needed additional support to respond and recover from the flood, which external organizations provided this? Please tick all options that apply.</p>	<p>Consider the gap between what communities could provide for themselves and what they need – ideally this gap should be met by external support. External support may be in the form of emergency services from outside the community, provision of evacuation facilities and resources, and aid (food, materials or money) for meeting basic needs and rebuilding after the flood.</p>	<p>Multi</p>	<ul style="list-style-type: none"> – The community did not need additional support – Government services – NGOs – Local volunteer organizations including Red Cross / Red Crescent – Neighbouring communities – Others – The community needed additional support but none was provided

Question	Guidance notes	Question type	Answer options
How much external support for flood response and recovery was provided by external organizations?	Consider the gap between what communities could provide for themselves and what they need – ideally this gap should be met by external support. External support may be in the form of emergency services from outside the community, provision of evacuation facilities and resources, and aid (food, materials or money) for meeting basic needs and rebuilding after the flood.	Option	<ul style="list-style-type: none"> – The community did not need additional support – Extensive external support was provided – Some external support was provided – A small amount of external support was provided – The community needed additional support but none was provided
Was external support for flood response and recovery accessed by all groups in the community?	Consider the gap between what communities could provide for themselves and what they need – ideally this gap should be met by external support. External support may be in the form of emergency services from outside the community, provision of evacuation facilities and resources, and aid (food, materials or money) for meeting basic needs and rebuilding after the flood.	Text	



Community volunteer brigades and armed forces in action during flood, Piura, Peru © Practical Action

Indicator O26: Sale of productive assets

Revealed resilience: Action

Context: Community Level

Theme: Livelihoods

Definition: This outcome variable is concerned with whether people are using the sale of productive assets to cope with the economic impacts of flood. The sale of productive assets is a negative coping strategy because it reduces long-term potential for economic growth.

Notes: Assess the percentage of the community that sold productive assets in response to this flood. Productive assets are those that help the household earn an income in the short and long term and include assets such as farm land, agricultural or business equipment (tractors, sewing machines etc.), vehicles used for income generation such as moto-taxis or delivery vehicles, and the liquidation of financial assets such as pension funds or investments. Livestock may be considered a productive asset if it is held for livelihood reasons, however in cases where livestock is held as a form of savings to be sold in the event of crisis (such as flood) it should not be considered a productive asset here.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
No community members sold productive assets in order to cope with flood event.	Less than 20% of the community sold productive assets in order to cope with the flood event.	20-50% of the community sold productive assets in order to cope with the flood event.	More than 50% of the community sold productive assets in order to cope with the flood event.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What percentage of households sold productive assets in order to cope with the economic impacts of the floods?	Productive assets are those that help the household earn an income in the short and long term and include assets such as farm land, agricultural or business equipment (tractors, sewing machines etc.), vehicles used for income generation such as moto-taxis or delivery vehicles, and the liquidation of financial assets such as pension funds or investments. Livestock may be considered a productive asset if it is held for livelihood reasons, however in cases where livestock is held as a form of savings to be sold in the event of crisis (such as flood) it should not be considered a productive asset here.	Percent	

Question	Guidance notes	Question type	Answer options
<p>What productive assets were most frequently sold to cope with the impacts of the floods?</p>	<p>Productive assets are those that help the household earn an income in the short and long term and include assets such as farm land, agricultural or business equipment (tractors, sewing machines etc.), vehicles used for income generation such as moto-taxis or delivery vehicles, and the liquidation of financial assets such as pension funds or investments. Livestock may be considered a productive asset if it is held for livelihood reasons, however in cases where livestock is held as a form of savings to be sold in the event of crisis (such as flood) it should not be considered a productive asset here.</p>	Text	



View from Shkodra Castle, Albania, during flood © Albanian Red Cross

Indicator O27: Risky livelihoods

Revealed resilience: Action

Context: Community Level

Theme: Livelihoods

Definition: This outcome variable shows how well the community is doing in avoiding the need to undertake dangerous or risky jobs to cope with economic losses (either direct damage or due to a depressed local economy) from the flood. While utilizing alternative livelihood strategies is typically beneficial for coping with floods, if those strategies are dangerous or risky they are a negative coping strategy because they erode overall wellbeing.

Notes: Assess what percentage of the community took on risky jobs in response to the flood, that they were not engaged in prior to the flood (compared to the pre-flood situation). Community members may have done these risky jobs in the past but had stopped prior to the flood, or this may be the first time they've done these risky jobs. A job is considered risky if it puts the community member at heightened risk of death or physical injury. Examples include unsafe mining or construction, unsafe fishing or agricultural operations, prostitution, exploitative domestic work, being involved with illegal drugs or other crime networks. Some jobs may be unsafe depending on the context, for example truck driving can be a safe job, but if drivers are required to stay awake for unreasonable periods of time, it can be unsafe and therefore a risky job. Other jobs may be unsafe because they require the community member to travel unsafe routes to access the job.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
The flood caused no increase in the number of community members undertaking dangerous or risky jobs.	Less than 5% of the community resorted to dangerous or risky jobs in order to cope with economic damage from the flood.	5-10% of the community resorted to dangerous or risky jobs in order to cope with economic damage from the flood.	More than 10% of the community resorted to dangerous or risky jobs in order to cope with economic damage from the flood.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What unsafe or risky jobs do community members do in normal times?	A job is considered risky if it puts the community member at heightened risk of death or physical injury. Examples include unsafe mining or construction, unsafe fishing or agricultural operations, prostitution, exploitative domestic work, being involved with illegal drugs or other crime networks. Some jobs may be unsafe depending on the context, for example truck driving can be a safe job, but if drivers are required to stay awake for unreasonable periods of time, it can be unsafe and thus a risky job. Other jobs may be unsafe because they require the community member to travel unsafe routes to access the job.	Text	

Question	Guidance notes	Question type	Answer options
<p>What percentage of community members started (or restarted) working in unsafe or risky jobs because of the economic impacts of the flood?</p>	<p>Assess what percentage of the community took on risky jobs in response to the flood, that they were not engaged in prior to the flood (compared to the pre-flood situation). Community members may have done these risky jobs in the past but had stopped prior to the flood, or this may be the first time they've done these risky jobs. A job is considered risky if it puts the community member at heightened risk of death or physical injury. Examples include unsafe mining or construction, unsafe fishing or agricultural operations, prostitution, exploitative domestic work, being involved with illegal drugs or other crime networks. Some jobs may be unsafe depending on the context, for example truck driving can be a safe job, but if drivers are required to stay awake for unreasonable periods of time, it can be unsafe and thus a risky job. Other jobs may be unsafe because they require the community member to travel unsafe routes to access the job.</p>	<p>Percent</p>	



River Thur, Switzerland, flooding in 2013 © Michael Szönyi, Zurich Insurance Group

Indicator O28: High interest credit

Revealed resilience: Action

Context: Community Level

Theme: Livelihoods

Definition: This outcome variable is concerned with whether community members have taken out high interest loans in order to cope with economic losses (either direct damage or due to a depressed local economy) from the flood. While utilizing credit is typically beneficial for coping with floods, if this credit is at high interest rates these loans are a negative coping strategy because they can erode wellbeing over time.

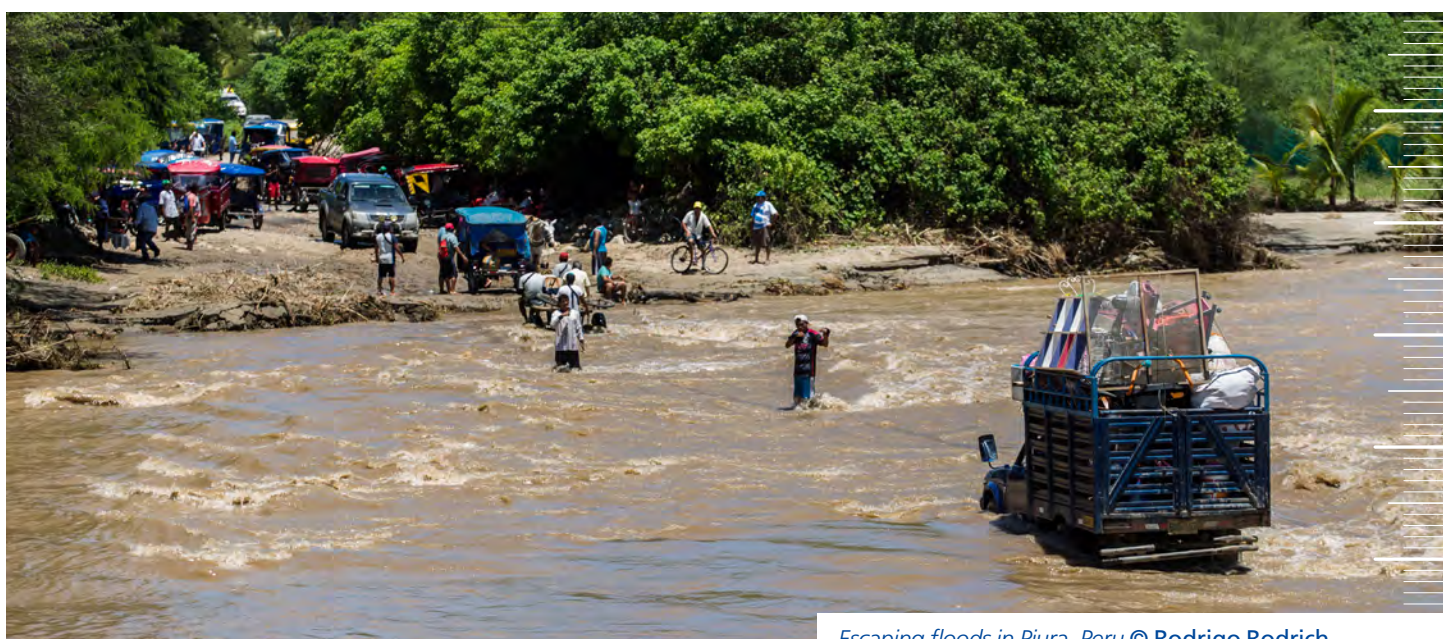
Notes: Assess what percentage of the community took out high interest loans in response to the flood. High interest loans may be from local informal lenders, pawn shops/dealers (where lenders need to provide collateral against the loan), 'payday' loans, or high cost short term credit from financial institutions. There is no strict definition of level of interest is considered 'high' as it depends on the local conditions, however anything with an annual interest rate of more than 25% is typically considered high. High interest credit also tends to have a short repayment window (for example less than 2 years) and strictly enforced payment schedules. Sometimes a lower interest loan may be classified as high interest if it comes with excessive fees and charges payable by the lender.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
The flood caused no increase in the number of community members taking out high interest loans.	Up to 5% of the community resorted to high interest loans in order to cope with economic damage from the flood.	5-10% of the community resorted to high interest loans in order to cope with economic damage from the flood.	More than 10% of the community resorted to high interest loans in order to cope with economic damage from the flood.

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What percentage of the community took out low interest loans to cope with the economic impacts of the floods?	Low interest loans are a good coping strategy. Low interest loans have lower interest (usually less than 20% per annum), low fees, do not require collateral and have a long repayment period. Low interest loans may be taken from formal institutions such as banks, local savings or credit groups, or informal lenders such as family or friends, religious organizations, and NGOs.	Percent	

Question	Guidance notes	Question type	Answer options
<p>What percentage of the community took out high interest loans to cope with the economic impacts of the floods?</p>	<p>High interest loans may be from local informal lenders, pawn shops/dealers (where lenders need to provide collateral against the loan), 'payday' loans, or high cost short term credit from financial institutions. There is no strict definition of level of interest is considered 'high' as it depends on the local conditions, however anything with an annual interest rate of more than 25% is typically considered high. High interest credit also tends to have a short repayment window (for example less than 2 years) and strictly enforced payment schedules. Sometimes a lower interest loan may be classified as high interest if it comes with excessive fees and charges payable by the lender.</p>	<p>Percent</p>	
<p>What were the key sources of high interest loans accessed by community members? Please tick all options that apply.</p>	<p>High interest loans may be from local informal lenders, pawn shops/dealers (where lenders need to provide collateral against the loan), 'payday' loans, or high cost short term credit from financial institutions. There is no strict definition of level of interest is considered 'high' as it depends on the local conditions, however anything with an annual interest rate of more than 25% is typically considered high. High interest credit also tends to have a short repayment window (for example less than 2 years) and strictly enforced payment schedules. Sometimes a lower interest loan may be classified as high interest if it comes with excessive fees and charges payable by the lender.</p>	<p>Multi</p>	<ul style="list-style-type: none"> - Local informal lenders - Pawn shops/dealers - 'Payday' loans - Financial institutions - Other - None



Escaping floods in Piura, Peru © Rodrigo Rodrich

Indicator O29: Insurance payments

Revealed resilience: Action

Context: Enabling Environment

Theme: Livelihoods

Definition: This outcome indicator is concerned with whether people had flood insurance in the community. Insurance can help households recover quickly from floods.

Notes: Assess what percentage of affected households and businesses have flood insurance and how quickly payments are made. If the community meets any of the criteria set out in D, grade D. For A, B and C grades, choose the highest grade where the community meets all criteria. For example, if 60% of affected households and 90% of affected businesses hold flood insurance policies which comprehensively cover their damage, and there have been some delays in insurance payments, grade B – the community has not met all the criteria for A.

A grade criteria	B grade criteria	C grade criteria	D grade criteria
<p>More than 80% of affected households hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>More than 80% of affected businesses hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>Insurance payments were received quickly following the flood event to support recovery.</p>	<p>More than 50% of affected households hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>More than 50% of affected businesses hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>There have been some delays in insurance payments, however this is not impeding overall recovery.</p>	<p>More than 20% of affected households hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>More than 20% of affected businesses hold flood insurance policies which comprehensively cover their damage.</p> <p><i>and</i></p> <p>There have been significant delays in insurance payments, which is impeding overall recovery.</p>	<p>Less than 20% of affected households hold flood insurance policies which comprehensively cover their damage.</p> <p><i>or</i></p> <p>Less than 20% of affected businesses hold flood insurance policies which comprehensively cover their damage.</p> <p><i>or</i></p> <p>No or very few insurance payments will be paid in time to support recovery.</p>

Questions to be asked in group discussions, key informant interviews, or answered from secondary sources:

Question	Guidance notes	Question type	Answer options
What percentage of affected households hold flood insurance policies which comprehensively cover their damage?		Percent	

Question	Guidance notes	Question type	Answer options
What percentage of affected households hold flood insurance policies but which do not comprehensively cover their damage (under-insurance)?		Percent	
What percentage of affected businesses hold flood insurance policies which comprehensively cover their damage?		Percent	
What percentage of affected businesses hold flood insurance policies but which do not comprehensively cover their damage (under-insurance)?		Percent	
How has the speed of insurance payouts influenced recovery?		Option	<ul style="list-style-type: none"> – Insurance payments were received quickly following the flood event to support recovery – There have been some delays in insurance payments, however this is not impeding overall recovery – There have been significant delays in insurance payments, which is impeding overall recovery – No or very few insurance payments will be paid in time to support recovery – Very few or no households or businesses in the community hold flood insurance

Flood Resilience Measurement for Communities post-event study plan: template

Appendix 1

This document provides a template for drawing up a post-event study plan. Post-event studies are an essential step in the Flood Resilience Measurement for Communities (FRMC) process and are conducted after a flood occurs in a community where the FRMC process is being implemented. Planning for the post-event study must occur early on, in normal/non-flood times. Planning should occur at the level of the country programme, with oversight from head offices as required.

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What is a post-event study?

A post-event study is conducted following a flood event in the community and consists of 29 'outcome variables', 26 of which are graded. Details on the post-event study can be found in the *FRMC post-event study user guide*.

What is a post-event study plan?

While the post-event study is conducted following a flood event, your post-event study plan must be in place before the flood, so that you and your colleagues are ready to implement the post-event study when the flood occurs. The post-event study plan details your estimates for staff resources and budget needed to implement the post-event study, and plans for data collection during and following the flood.

You can estimate the resources needed to do the post-event study by thinking about what you used to do the baseline. A post-event study will be less resource-intensive than a baseline study for two reasons: 1) it has 29 variables instead of 44; and 2) it does not involve household interviews. Also remember that, because you and your team have already done a baseline study, you are more experienced in using the FRMC process and are therefore more efficient.

This template is a guide for setting up your post-event study plan. It needs to be revisited after every post-event study, or every year if no studies have been triggered.

Post-event study plan template

Before filling out this template and making your post-event study plan, it is essential that you **study and discuss the *FRMC post-event study user guide***.

This template has two parts: 1) a series of questions to consider before you start (Table 1); and 2) a task list (Table 2).

Table 1: Questions to consider before making the post-event study plan

Question	Answer
In which communities have we implemented baseline studies and therefore need to implement post-event studies in (if triggered)?	
When are floods most likely to occur in these communities?	
Are floods likely to occur in all communities at the same time?	
Are floods that will trigger a post-event study predicted in the next year?	
What warning systems are in place that we should monitor?	
How much warning time can we expect?	
Where are we likely to get information about the flood during the event?	
Where are we likely to get information about the flood following the event?	
Which people/groups are going to be involved in the flood response and be good sources of information?	
If we are going to be part of the response and recovery, can we do some post-event study data collection during that period?	
What are the goals of our interventions that we can assess when the flood occurs?	
How are we going to manage community expectations? (Note that the post-event study asks about many flood impacts, which can raise community expectations.)	
How can we use the results in our work within the community?	
How can we use the results in our advocacy work?	

Table 2: Post-event study plan task-list

Task	Person responsible	Tick when complete
Read and discuss the <i>Post-event study user guide</i> and answer the questions Table 1.		
Discuss the post-event study with communities to make them aware that it will occur and to help manage expectations.		
Designate staff to monitor flood warnings.		
Designate staff to collect media, meteorological, and other reports when a flood occurs.		
Plan how you are going to collect data and who your PES field workers are going to be.		
Set-up post-event studies (one for each community) in the FRMC system – do not activate until flood occurs.		
Develop a timeline for when you are going to activate the post-event study, collect data, do grading, and use results.		
Plan for how you are going to share results with the community and other stakeholders.		
Estimate the costs of undertaking post-event studies and using results to review priorities and adapt future projects.		
Get approval from those responsible for staffing and budget to undertake post-event studies when a flood occurs.		
Based on elements from previous tasks (timeline, costs, responsibilities, etc.), write up your post-event study plan, ensure all relevant staff are aware of it, and refer to it regularly.		

Post-event case studies

Appendix 2

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Case study 1: Bangladesh 2019, by Concern Worldwide

The flood event: Bangladesh experienced severe flooding in July 2019. Heavy monsoon rainfall occurred throughout the country, which led to extensive flooding in low-lying areas of northern, north-eastern, and south-eastern districts. Generally, Bangladesh experiences three types of floods: monsoon floods, flash floods, and long-term waterlogging. These are more or less common across various geographic regions. The flooding in 2019 was distinct due to the combination of all three types of floods occurring simultaneously across three different parts of the country.

The post-event study process: The post-event study was conducted after the flood event in November 2019, in both the Gaibandha and Lalmonirhat districts. The 'cluster system' is an approach applied by Concern Worldwide to better understand natural capital and its connections to different aspects of resilience, and to provide a framework for applying meso-scale, nature-based solutions. For the post-event study, by analyzing certain communities as clusters as well as separately, we were able to understand across a broader area the change in resilience and how project activities are building on existing resilience.

Key findings from the post-event study

- Within each district, there are relatively small differences between the clusters.
- Increasingly, there is a drive for green flood management solutions for flood management that recognize the inherent value of the riverine landscape in regulating flooding. The areas of focus identified are: the role of natural capital in buffering flood impacts; the connection of green solutions to grey solutions; and influencing how natural capital is used to strengthen flood mitigation.
- Governance, for managing resources, is critical to address flood risk. The study outcomes show a good level of awareness of flood risk in the communities, but a lack of practical actions at the governance level and the level of flood-risk learning.
- The need for a strong early warning cannot be over-emphasized. A locally owned system needs to complement the national early-warning system. A key issue is to enable the community to take the correct action at the right time based on their understanding of flood behaviour, even before a formal notice of a flood event. This could prevent mortality and ensure a safe evacuation and return to enable a faster recovery.
- There are few livelihood opportunities in terms of access to resources and support for change to cope with floods. The lack of connection between the community and governance structures affects the ability of households to access critical funds needed for meaningful change. Although there is a good level of knowledge of asset protection, it may not translate effectively into practices and behaviours that would lead to more positive outcomes regarding flood resilience.

Lessons learned

- More focus is needed on strengthening early warnings, livelihoods, natural capital and assets protection, and focusing on the right combination of approaches towards flood resilience. The project team needs to improve links between community action, governance, and flood-resilience impacts based on post-event study findings and recommendations.
- The recommendations from the post-event study were useful for ongoing advocacy and local-level FRMC interventions.
- The post-event study was also used to inform Concern Worldwide's natural capital work. Concern Worldwide is now working with Esolve, an environmental consultancy firm, to develop a natural capital flood risk management strategy to guide decision-making in this area.
- Teams should prepare for the post-event study from the beginning of the flood and gather information from a wide variety of sources. Following the flood period, the required data may not always be available from government authorities.
- There is a need for extensive training and capacity building of enumerators so that accurate information is collected from the field.
- Nature-based flood management should be added to the study design for those working with this approach; if it is incorporated with the post-event study, it may be helpful for those who are working with nature-based solutions.



Dhuhni, Hatibandadha, Bangladesh, 2022. Credit: Moktar Hossain

Case study 2: Mexico 2020, by the Mexican Red Cross

The flood event: In October and November 2020, a series of cold fronts and two cyclones caused severe flooding in the Mexican states of Chiapas, Tabasco, and Veracruz. In the state of Tabasco, significant rainfall, flooding, landslides and water discharged from the Ángel Albino Corzo ‘Peñitas’ hydroelectric dam left the region under water. In total, the storms and resulting floods inundated 14 per cent of the state and affected nearly 800,000 people.

The post-event study process: The Mexican Red Cross assessed the situation in four communities affected by the October and November 2020 floods in the municipalities of Jonuta and Teapa, Tabasco (the area in which the Zurich Flood Resilience Alliance project in Mexico operates).

Key findings from the post-event study

- Sources of income were impacted negatively in all four communities. Almost all of the population in the communities of Teapa reported that it would take between three and 12 months to recover from the floods, and 30 per cent of the population sought loans from financial institutions to cope with the damages caused by the floods. In contrast, in the communities of Jonuta, 30 per cent of the population reported that they would be able to recover within three months of the floods and did not need to seek loans from financial institutions. None of the communities reported that families resorted to selling productive assets to recover financially from the floods.
- The population received financial support for flood recovery via emergency funds managed by the federal government, as well as humanitarian aid from the Mexican Red Cross, NGOs, and other donations. The population acknowledged that the support was extensive and equitable.
- In some communities, flooding caused the spread of pesticides that contaminated pastures and, when ingested by animals, caused their death. The decomposition of dead animals increased environmental contamination and community members' contact with contaminated water led to skin infections.
- Contaminated water and prolonged humidity, which only reduced approximately three months after the floods, caused various diseases among the population. An increase in diseases (such as dengue fever, diarrhoea, respiratory infections, dermatitis, and foot fungus) was observed. In addition, continued humidity led to the loss of medical records, which interrupted ongoing medical attention for residents.
- While the community members reported that there is no early-warning system within the community itself, they receive flood warnings from local authorities and, in some cases, from members of the community brigade. The post-event study found that the communities have their own monitoring mechanism through direct observation of the rivers. The communities share information through

loudspeakers, megaphones, and social media, which is sometimes limited given that not everyone has internet access.

Lessons learned

- Early-warning system technical components exist at the state and federal level and, in 2020, flood warnings were disseminated and received by some communities. Community brigades facilitated the sharing of early-warning messages and monitored rivers with hydrometric scales painted on wooden sticks or trees. However, the communication strategy needs to be improved, especially to reach the most remote communities.
- Financial mechanisms for emergency response and recovery facilitated the management of the 2020 floods. In one case, the community brigade contacted key government actors to manage external support. There is a need to promote connections with government institutions to ensure support in the case of flooding.
- The promotion of family savings strategies is important in the case of flooding as well as more generally. Savings strategies allow families to cover everyday expenses during floods when access to sources of income may be temporarily blocked.
- The distribution of humanitarian aid by the Mexican Red Cross was efficient. Basic family details were incorporated into a community census via a mobile phone app to avoid the duplication of aid.
- The extended prevalence of post-flood illnesses indicates the need to promote participatory hygiene and sanitation transformation training (PHAST).



Delivery of humanitarian aid in the 2020 floods, Jonuta, Tabasco, 2020. Credit: Gabriel Reyes, Operational Manager, Mexican Red Cross

Case study 3: Cyclone Amphan 2020, Bangladesh, by Practical Action

The flood event: Cyclone Amphan devastated Bangladesh in the middle of the COVID-19 pandemic in 2020 and was followed by severe flooding. The flood water damaged embankments, spilled into surrounding settlements, and waterlogged 0.2 million hectares of agricultural fields and fish farms, which also affected 5.4 million people and 1,059,295 households in Bangladesh. Communities in Faridpur experienced flooding three to four times between June and September

The post-event study process: Practical Action assessed the post-flood status of the eight flood-affected vulnerable communities in Faridpur district (the area in which the Zurich Flood Resilience Alliance project in Bangladesh operates) after the major flood in July 2020.

Key findings from the post-event study

- Around 60 per cent of the population experienced unfavourable effects on their income sources.
- Most people did not recover from the detrimental impacts of the flood within three months. During the floods, 80 per cent of those impacted sold their productive assets/crops, such as rice, jute, wheat, maize, and cattle. People took up livelihood measures, such as fishing and working as transport labourers, drivers, and van pullers, among others.
- Many people were in debt because of loans from NGOs, government organizations, and local residents (*mahajans*), which worsened their financial load. There was no insurance in the affected areas that could aid with flood-damage recovery.
- People did not prioritize their health because of the distance to health centres and the lack of a stable medical team. It was estimated that 10–15 per cent of people suffered from hunger. Due to rising food prices and restricted sources of potable water during the floods, almost 90 per cent of families were unable to obtain healthy meals.
- During the flood, neighbourhoods were polluted by dead animal remains, rubbish, and various other waste; as a result, water-borne diseases increased.
- Theft and robbery were more prevalent than usual. Most incidents affected local people and were committed at night.
- People mentioned that they did not receive proper support for river embankment protection and flood warnings, although the Water Development Board (WDB) claims to work all year to improve flood protection and dredging. The local *Union Parishad* only receives funds when a flood is predicted, implying that actions are centred on during/post-flood and short-term solutions. However the eight communities in the four working Unions of Practical Action, received early warnings as voice messages via mobile phones- were able to take actions to protect themselves and minimize damages to their assets.

Lessons learned

- Local-level *Union Parishads* need greater funding and capacity building to be fully able to manage flooding locally.
- Impact-based flood early warnings need to reach the 'last mile' with adequate lead time. Flood early warnings need to reach the 'last mile' with adequate lead time.
- Improved coordination and collaboration between communities, local government, and institutions are required to better understand community needs.
- Emergency response actors can do more to reduce disruption and the recovery time frame.
- Local people believe that NGOs can distribute relief more effectively than the local authority.



Women carrying drinking water in boats from faraway places, Charnasirpur, Faridpur. Credit: S M Ashikul Islam, Practical Action, 2021

Case study 4: Tropical storm Amanda-Cristobal 2020, El Salvador, by Plan International

The flood event: Between 29 May and 7 June 2020, a low-pressure system south of the coasts of El Salvador and Guatemala caused heavy rainfall over Central America. The event later became known as tropical storm Amanda-Cristobal impacting the lives of more than 53,000 households and damaging nearly 13,000 houses, 128 bridges, and 392 schools across El Salvador. “Amanda-Cristobal” also damaged 2,800 hectares of crops and forced 12,600 people to relocate to temporary shelters. This happened at the height of the COVID-19 pandemic, during which Salvadorian citizens already had to cope with extraordinary measures imposed by the government, such as mandatory quarantine that lasted several months.

The post-event study process: Plan International El Salvador assessed the post-flood status in two project communities impacted by Amanda-Cristobal: Colima, Department of Cuscatlán, and El Majahual, Department of La Libertad (see Figure A1). The study was conducted between September and November 2020.

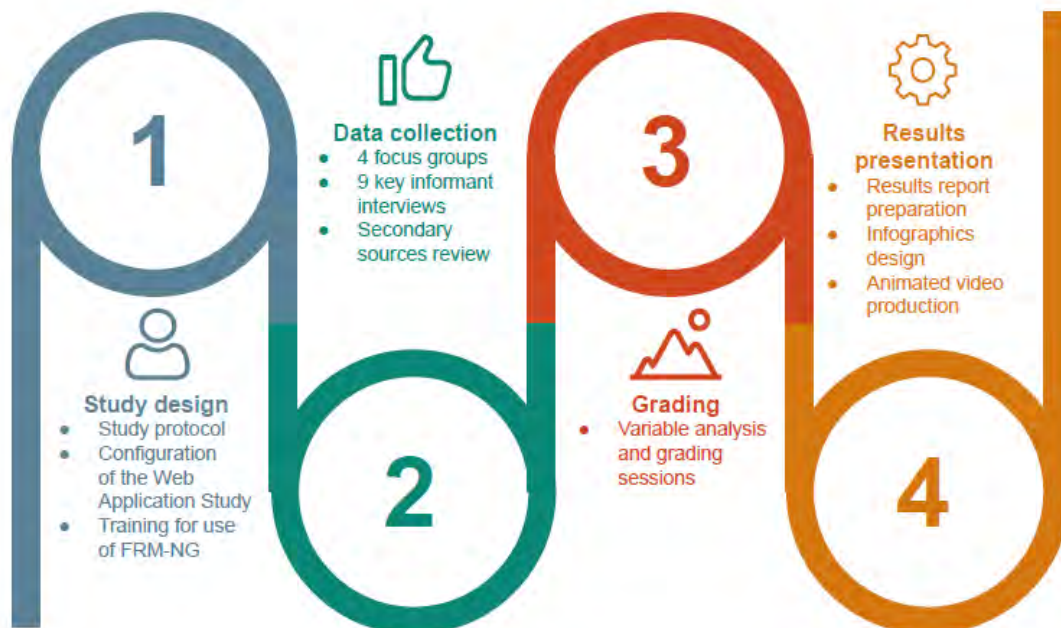


Figure A1 Process to implement the post-event study in El Salvador following tropical storm Amanda-Cristobal in 2020. © Plan International

Research participants. The focus-group discussions involved members of the Community Civil Protection Commission, the board of directors from the Community Development Association, local shopkeepers, and children and youth from both communities. In total, 78 people participated in the group discussions. Key informant

interviews were conducted with local health promoters, school principals, community leaders, technical staff from the Municipal Environmental Unit, the General Directorate of Civil Protection, and a forecasting specialist from the Ministry of Environment and Natural Resources.

Key findings from the post-event study

- In both communities, more than 40 per cent of all houses, business premises, and agricultural land were severely damaged during the flood. The measures that the community took to protect their assets were limited and largely took place at the household level, which is an indication that the community response committees – established under the framework of the project – still need to be further strengthened. There was no external assistance, which can at least be partially attributed to the fact that local authorities were focused on combating COVID-19 at the time of the flood. The communal early-warning systems are still rudimentary, as a result of which most community members did not evacuate until the flood was imminent. The communal waste-management system does not function well, there is little to no connection to governmental services, and community members need to travel long distances to access hospitals.
- On a positive note, there were no fatalities. This could perhaps be because the flood was not severe enough, but also because most community members were aware of the general flood risk and had taken basic measures, like placing sandbags in front of their homes. Education facilities remained open, except for the time when the National Civil Protection Commission issued a red alert. Another reason why facilities remained open can be attributed to the fact that the whole country was in the midst of delivering schooling virtually at the height of the COVID-19 pandemic (which came with its own challenges).

Lessons learned

- The repair of community infrastructure took more than a year or was not completed at all. This can at least partially be attributed to the fact that two financially vulnerable communities had to face the dual burden of coping with Amanda-Cristobal and the COVID-19 pandemic.
- Flood resilience awareness-raising campaigns in advance of the flood event and delivered through the activities of the project led to some progress, but more remains to be done, so that everyone takes the necessary precautions and all community members evacuate on time.
- Given the restrictions to access the communities at the time (El Salvador was still under complete lockdown due to COVID-19 restrictions), the project team completed the post-event studies virtually using Zoom and WhatsApp as the main platforms. The team referred to the guidelines provided by the Alliance for online data collection, with slight adjustments to the methodologies for focus-group discussions. Plan International provided resources to people (via the internet) to participate in the sessions. It is important to consider the time that needs to be dedicated to virtual sessions and the limited access for some participants. Not all people have devices that optimally support platforms such as Zoom. This is why an introductory training on the use of virtual platforms should be considered for research participants. Plan International provided virtual tutorials to the research participants, showing them how to use these platforms.

- The early-warning system should be strengthened for timely evacuation. This needs to be coordinated through the local response committees (both at community and school level), which are linked to the General Directorate of Civil Protection. Plan International has already started working on this through interventions linked to the project.
- The communities need to establish stronger ties to the municipality, which can be facilitated by Plan International, to improve the solid waste-collection system and prevent rubbish from blocking canals.
- The project team has developed various knowledge products (infographics, videos, and reports) in Spanish and English to promote the dissemination of results in the communities and government institutions, with the aim of expanding their understanding of resilience and promoting Influencing actions. These outputs have been well received by the communities and government institutions, making it possible to promote some of our interventions in conjunction with government institutions at the national level.
- In general, public services often do not extend to vulnerable communities like Colima and El Majahual, and this remains a real challenge. The post-event study outputs (infographics, videos, and reports) can be powerful advocacy tools to improve this situation.
- It is easy to fall into the trap of comparing post-event study results with t-line study results. However, these two sets of studies are fundamentally different, should be treated separately, and do not allow for a like-for-like comparison.



Members of the Communal Civil Protection Commission cleaning the Cerrón Grande water reservoir prior to the rainy season in the community of Colima, March 2020. Credit: Plan International.



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