Photo Credit: Radeno Haniel/AFP via Getty Images

LIVELIHOODS COST-EFFECTIVENESS BRIEF - Anticipatory Cash

Nigeria | 2022

Executive Summary

The International Rescue Committee (IRC) implemented an anticipatory action cash-distribution pilot among six agro-pastoralist communities in Northeast Nigeria, focused on reducing the damaging effects of flooding. Prior to the flood season of 2022, the IRC set up an early warning system with local hydrometeorological agencies to trigger pre-flooding cash distribution to resource-constrained communities vulnerable to flooding. The program aimed to improve the adaptive capacities of these communities through improved systems for information sharing about climate risks and severity, and resource access to undertake mitigation measures. Researchers measured the cost-effectiveness of a pre-flooding cash distribution triggered by the early warning system, as compared to traditional post-shock resource disbursement. 1,450 households were randomly assigned to receive pre- or post-shock distributions.

Low cost-transfer ratios, in addition to positive impact evaluation results, suggest that the pre-shock modality may be more cost-effective than business-as-usual post-shock transfers. The Anticipatory Cash project cost $695 per household receiving pre-shock cash transfers, which drops to $610 per household without system set-up activities. 71% of total group costs went to the cash grant itself. Similar cost-transfer ratios between pre- and post-shock groups suggest that the anticipatory cash response is just as cost-efficient as the post-shock modality.

Project Description

Northeast Nigeria is home to agro-pastoral communities that are increasingly affected by drought and seasonal flooding. The humanitarian crisis in this region is compounded by climate change, protracted conflict, and internal displacement. While the agro-pastoral communities know how to protect against flooding, communities may act too late due to resource constraints and limited coping strategies.

Anticipatory action is increasingly looked to as a key response mechanism for mitigating damages caused by disasters such as flooding. This is facilitated through producing early warning systems and forecast-based financing (FbF), typically in partnership with hydrometeorological agencies, governments, and NGOs. Through predictive modelling of hydrometeorological events, early warning systems are designed to monitor the onset of disasters and trigger an anticipatory action response when a disaster is imminent. An anticipatory response will release time-sensitive resources to affected communities prior to the onset of or peak in impacts of the disaster. This pre-shock distribution allows affected communities to access supplies needed to prepare and protect their homes and families before the disaster occurs. Early action is increasingly identified as a potentially effective approach to reduce the death toll and destruction caused by hydrometeorological events.[ii]

Box 1. Anticipatory Cash Project: Activities

Pre-Shock Anticipatory Action:

- **Early warning system trigger set-up:** IRC worked with local communities and national hydrometeorological agencies to set up the early warning system and identify the probability threshold for triggering the release of anticipatory cash. System set-up also included: sensitization among flood-affected communities, including early warning messages, and cash-transfer pre-positioning with local financial service providers.[i]
- **Pre-shock cash transfers:** 725 households across six communities received cash-transfers one month prior to the onset of flooding, at the end of July 2022. The timing of this transfer was triggered by the early warning system 14 days before peak flooding was anticipated to occur.

Business-as-usual Humanitarian Aid:

- **Post-shock cash transfers:**

  725 households across six communities experienced traditional humanitarian cash transfers, which were distributed after the onset of flooding, in November 2022.

In October 2021, the International Rescue Committee (IRC) launched a pilot anticipatory cash project.[iii] The IRC worked with local communities and national hydrometeorological agencies in Nigeria[iv] to produce a data platform that would use forecast data to anticipate the probability of flooding. Once a probability threshold was reached indicating the onset of peak flooding, the system triggered a pre-shock cash transfer to households in the flood zone of Adamawa state. The trigger provided a 14-day window before the onset of flooding to allow time for families to purchase the supplies needed for preparation.[v] Supplies were given without restrictions and included basic necessities, food, investments in productive assets, preemptive and post-flood actions.

To understand impact and cost-effectiveness of anticipatory cash transfers on economic well-being and climate resilience of resource-constrained small-holder farmers in northeast Nigeria, the IRC conducted an impact evaluation between October 2021 – December 2022. The evaluation compared effects of pre-

shock cash transfers to traditional humanitarian cash transfers *after* the disaster occurred (business-as-usual post-shock transfers). This allowed the IRC to understand, and compare, the effectiveness of anticipatory actions during the flood season in August-September of 2022. After constructing a sampling frame using blanket registration, the IRC used stratified random sampling with proportionate allocation by gender and community to identify households for the study who were then randomly assigned to either the treatment or control group.

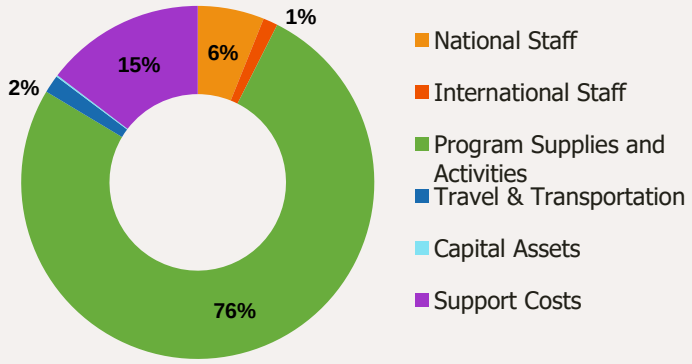
Project Costs

The Nigeria anticipatory cash program cost $695 per household compared to $598 per household for business-as-usual post-shock transfers.

A total of $937,606 was spent on the anticipatory cash project to assess the value of providing pre-shock cash transfers versus business-as-usual post-shock transfers, to flood-affected households. Including shared costs (sometimes referred to as support costs), the total cost for pre-shock amounted to $503,988, compared to post-shock at $433,618.

The total cost per household of both pre and post shock transfers was driven by the value of the cash transfers. Cash grants distributed to 1,450 households split across pre- and post-shock encompassed nearly 71% of the total project costs. The pre-shock group received $469 per household and the post-shock group received $448 per household. The difference in cash grant value was because of inflation and fluctuations between the cash distribution periods.

Figure 1. Cost Category by Percentage of Total Spending



With less than one-third of the costs used for set-up and implementation, the program would likely benefit from "economies of scale" when implemented to more households. The cost per household without the cash grant values was $226 for pre-shock and $150 for post-shock. Apart from the grants, the next two largest cost buckets included shared costs[vi] (15%) and staff time and effort (7%) during system set-up and implementation. These costs are "fixed" at the project level, compared to cash grants, which scale per household. The cost-efficiency cannot be lower than the cash value of the grant using cost per household. Any "returns to scale" would be produced by spreading the fixed project costs across more clients.

Costs for staff time comprised only 7% of total program costs.

IRC staff time was used for: a) overall project coordination, b) monitoring key activities, and c) engaging with hydrometeorological agencies. These agencies were key components of the early warning system who shared data on flood monitoring required to trigger the pre-shock cash transfer. Aside from staff time, costs for travel and transportation were driven by staff visits with hydrometeorological agencies and field visits. These implementation costs were relatively low compared to the value of the cash transfer.

Separating system set-up costs and implementation costs is important to understanding the cost of anticipatory action in successive years of implementation.

Engagement with hydrometeorological agencies was integral for system set-up. Other costs for set-up were incurred under the program supplies and activities category, including coordination with financial service providers, community sensitization, hall rentals, flood trigger readiness and activation workshops and training. Since system set-up occurs only once, successive years of implementation will likely incur lower costs per household (a reduction of $85 per household).

Aside from the grant, ongoing costs for implementation under the program supplies and activities category included: service charges for the cash transfers, stipends for community volunteers involved in documented flooding, hydrometeorological data access, routine and post-distribution monitoring, and other basic supplies such as megaphones, gum boots, and raincoats for early warning community workers.

Similar costs per household for pre-shock and post-shock interventions suggest that anticipatory cash is just as cost-efficient as business-as-usual humanitarian aid.

Implementation of the anticipatory cash pre-shock treatment cost $97 more per household than post-shock households, $695 and $598 per household respectively. However, **without set-up costs, the magnitude of difference between pre-shock and post-shock delivery shrinks by half**, to an 8% ($48) difference, where cost per pre-shock household drops to $610, compared to $562 for post-shock, as depicted in Table 1.

After the removal of system set-up costs, the $48 difference in cost per household between the pre- and post-shock modality was driven by inflation and additional operational costs. All households received the same total cash amount in Nigerian currency; however, inflation induced a $21 dollar difference per household between pre- and post-shock cash transfers when translated to USD. The remaining $27 difference can be attributed to other ongoing costs such as stipends delivered to hydrometeorological agencies and post-distribution monitoring.

Table 1. Cost by Treatment Arm

Cost by Treatment Arm		Cost-Efficiency by Arm with System Set-up			Cost-Efficiency by Arm without System Set-up		
	Direct Program Cost	Total Cost	Total Cost per Household	Total Cost per site	Total Cost	Total Cost per Household	Total Cost per site
Pre-shock	$ 430,281	$ 503,988	$ 695	$ 83,998	$ 442,410	$ 610	$ 73,735
Post-shock	$ 370,202	$ 433,618	$ 598	$ 72,270	$ 407,227	$ 562	$ 67,871

Total cost includes direct program costs and shared costs.

The cost-transfer ratio (CTR) provides insight into the relative cost-efficiency of the cash transfer modality and is the standard cost-efficiency metric for cash distribution programs. The CTR is a ratio of spending required to complete the cash transfer, divided by the total dollar amount of cash transferred:

Figure 2. Cost Transfer Ratio (CTR) Calculation

$$CTR = \frac{Delivery\ Cost}{Dollars\ transferred\ to\ clients}$$

Higher CTRs indicate less cost-efficient programming, whereas lower CTRs indicate greater cost-efficiency. Compared to post-shock transfers, the pre-shock CTR is relatively similar, suggesting that the pre-shock intervention is nearly as cost-efficient as the post-shock business-as-usual model. Additionally, the CTR for pre-shock transfers drops from $0.48 to $0.30 once system set-up costs are removed, reducing the magnitude of difference, as depicted in Table 2. This means that for every dollar transferred, the resource required to undertake the transfer dropped from $0.48 to $0.30 when system set-up costs were removed.

Table 2. Cost-Transfer Ratio (CTR)

Cost Transfer Ratio by Treatment Arm	With System Set-up	Without System Set-up
Pre-shock	$ 0.48	$ 0.30
Post-shock	$ 0.33	$ 0.25

The cost-efficiency of the pre-shock intervention is reinforced once system set-up costs are removed: **after the first year of pre-shock interventions, the cost to implement the anticipatory cash program ($0.30 CTR) is similar in magnitude to the business-as-usual post-shock cash distribution intervention ($0.25 CTR)**. Compared to other cash transfer programs at the IRC in similar contexts, this CTR is relatively low, which may be due to the limited additional programming needed for this intervention.

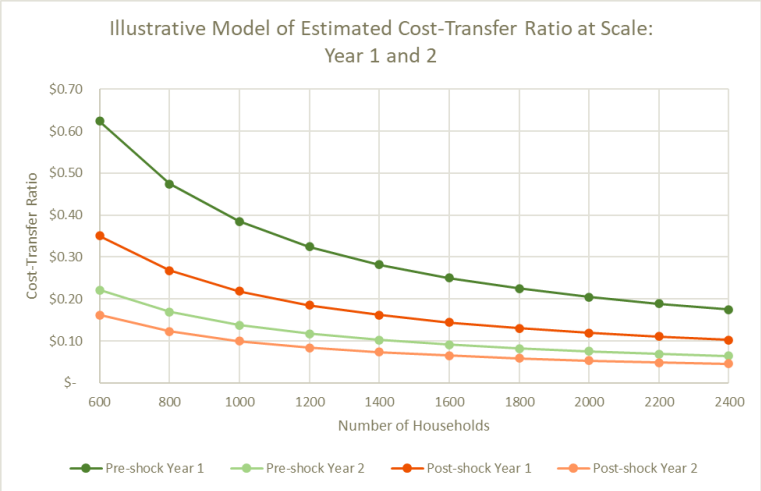
While cost data on anticipatory programs is currently limited, given the newness of the sector, a 2019 study conducted by the Start Fund provides data that allows for a calculation of CTR on a grouping of anticipatory projects in Nigeria, Sri Lanka, and Somalia. For projects delivering cash (in the form of unconditional cash transfers, vouchers, or cash-for-work), the average CTR for these projects can be calculated as $0.49, similar to the Nigeria Anticipatory Cash pre-shock CTR when including set-up costs.[vii]

Cost-efficiency gains increase with scaling anticipatory responses over time and across more households.

To understand how benefits to scale accrue, the CTR for pre- and post-shock modalities were modelled over a two-year period of time. Year 1 included system set-up costs and implementation costs, versus year 2 which included only implementation costs. The model assumed a fixed number of villages reached, given that the flood gauge data used would be most accurate for the villages in a particular radius. Additional gauge data points would need to be gathered to spread the program across other villages. The model also retains the assumption that amongst system set-up costs gathered, 70% were allocated to pre-shock, whereas 30% were allocated to post-shock. This assumption is recommended for further testing in future to evaluate whether this estimates too low of set-up costs for the BAU post-shock

modality, given that post-shock program structures were able to benefit from the pre-shock program structures set up in the months prior.

Figure 3. Illustrative Model of Estimated Cost-Transfer Ratio (CTR) at Scale



The pre-shock CTR remains above post-shock at all points in time driven largely by fixed costs, including climate messaging partner stipends. However, the model illustrates that once the system is established in year 1, cost-efficiency in year 2 can closely mirror that of the post-shock BAU modality across all points in scale. These ratios are depicted below in Table 4.

Table 3. Illustrative Model of Estimated Cost-Transfer Ratio (CTR) at Scale

No. Households	Pre-shock		Post-shock	
	Year 1	Year 2	Year 1	Year 2
600	$ 0.62	$ 0.22	$ 0.35	$ 0.16
1200	$ 0.32	$0.12	$ 0.19	$ 0.08
1800	$ 0.22	$ 0.08	$ 0.13	$ 0.06
2400	$ 0.18	$ 0.06	$ 0.10	$ 0.05

It is important to note that if additional gauge data were to be added to the program, it is likely that several fixed cost parameters would be able to spread out among more households reached. For this reason, the IRC Best Use of Resources team recommends assessing feasibility and costs parameters associated with spreading to additional regions.

Results of the Impact Evaluation

The impact of the anticipatory cash project was evaluated using a randomized controlled trial (RCT) in partnership with IFPRI. Outcomes among treatment communities who received the pre-shock cash transfer were compared to communities who received post-shock cash transfers. The following key findings were identified, listed by impact domain.

- **Increase in Climate Resilience** –

  The anticipatory cash program led to small but statistically significant improvements for households in terms of greater investment in productive agricultural and livestock assets, compared to the post-shock group. Small but significant improvement in livelihood diversification of non-agricultural income was also observed among the pre-shock group, compared to post-shock.

- **Reduction of negative coping strategies** –

  Households who received pre-shock cash transfers also exhibited fewer negative coping strategies than the post-shock group, measured through the rCSI and LCSI.

- **Climate adaptive indicators and household welfare** –

  Households who received pre-shock cash transfers took more pre-emptive actions, on average, compared to households who received post-shock transfers.

  No significant differences were observed improvements in food consumption, with both groups experiencing overall improvements in food security.

Cost-Effectiveness Findings

Low cost-transfer ratios, combined with positive impact, suggest that pre-shock transfers may be a more cost-effective modality for humanitarian aid, compared to traditional approaches.

Assessments of cost-effectiveness are comparative by nature. This means other comparative cost data needs to exist to determine the relative cost-effectiveness of the analyzed program. Currently, there is very little cost evidence on anticipatory action programs, given how new anticipatory responses are in the humanitarian sector with very few accompanying cost analyses. As a result, conclusions about the cost-effectiveness of the Nigeria Anticipatory Cash program can only be hypothesized at the time of writing. However, conclusions can be drawn on the cost-effectiveness between treatment arms (pre- and post-shock groups).

The positive impact evaluation results indicate that the anticipatory intervention produced significant differences on economic wellbeing and climate resilience for farmers seeking to diversify their livelihoods in efforts to mitigate economic damages from the flooding. Pre-shock households also used fewer coping strategies in response to the flooding when compared with the post-shock group. Given the positive impact results, in addition to the low CTR of the pre-shock modality compared to business-as-usual post-shock cash distributions, it is hypothesized that the pre-shock anticipatory action holds the potential to be more cost-effective in humanitarian responses than traditional post-shock distributions.

As cost-effectiveness data emerges from other studies on anticipatory cash, these hypotheses can be revisited and confirmed.

Analysis Method: Cost-Effectiveness at the IRC

The IRC is committed to maximizing the impact of each dollar spent to improve our clients' lives. Cost effectiveness analysis compares the costs of a program to the outcomes it achieved (e.g., cost per diarrheal incident avoided, cost per reduction in intra-family violence). Conducting cost effectiveness analysis of a program requires two types of information:

1) An impact evaluation on what a specific program achieved, in terms of outcomes
2) Data on how much it cost to produce that outcome

Teams across the IRC produce a wide range of outcomes, but cost effectiveness analysis requires that we know - based on impact research - exactly which outcomes were achieved and how much they changed, for a given program. For example, an impact evaluation might show a village that received IRC latrines and hygiene promotion had a 50 percent lower incidence of diarrhea than a village next to it which did not receive the IRC intervention. If so, we know the impact of our program: 50 percent decrease in diarrhea incidence. Cost effectiveness analysis becomes possible only when there is an impact study that quantifies the change in outcomes as a result of the IRC project.

At the same time IRC runs impact evaluations, we gather data on how much the evaluated program costs. First, IRC staff build a list of inputs that were necessary to implement the evaluated program. If one thinks of a program as a recipe, the inputs are all the 'ingredients' necessary to make that dish. Budgets contain a great deal of information about the ingredients used and in what quantities, so reviewing the program budget is the first place to start. However, many of the line items in grant budgets are shared costs, such as finance staff or office rent, which contribute to multiple programs, not just the one included in the impact evaluation. When costs are shared across multiple programs, it is necessary to further specify what proportion of the input was used for the particular program. Specifying such costs in detail, while time-consuming, is important because it provides lessons about the structure of a program's inputs. We can divide costs into categories and determine whether resources are being allocated to the most important functions of program management and enable us to model alternative program structures and quantify the cost implications of different decisions.

[i] The United Bank of Africa.
[ii] Weingartner, L., Pforr, T., and Wilkinson, E. 2020. "The evidence base on anticipatory action." World Food Programme. **Link.**
[iii] The project was funded by Google.org and in partnership with the International Food Policy Research Institute (IFPRI).
[iv] The early warning system trigger was developed in collaboration with the Nigeria Hydrological Service, the Nigeria Meteorological Agency, Upper Benue River Basin Development Authority & Community Based Early Warning System Workers.
[v] Peak flooding occurred approximately 1 month after the onset of the trigger system.
[vi] Shared costs refer to support costs which covers operations, support, and management.
[vii] Cost-transfer ratio was calculated from data provided in exhibit 23 (page 31) of Turnbell, M., et al. 2020. "Start Fund: Final Evaluation of Crisis Anticipation." Start Fund. **Link.** The CTR was calculated using the cash average line only, for comparability to the Nigeria Anticipatory Cash project. Delivery costs were calculated by subtracting the direct transfer amount from the total cost.

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This work was conducted by the Best Use of Resources Initiative at the IRC. For questions or more information please contact us at **airbel@rescue.org**.

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Ingredients List

Nigeria | 2022 USD

Program Costs	Pre-shock	Post-shock	Total
Program Staff	**$ 48,769**	**$ 20,968**	**$ 69,737**
ERD Technical Advisor *(International)*	$ 5,713	$ 2,466	$ 8,179
ERD Research Coordinator *(International)*	$ 1,936	$ 581	$ 2,518
ERD Senior Manager	$ 7,934	$ 3,821	$ 11,754
ERD Manager	$ 7,759	$ 3,653	$ 11,412
ERD Officer	$ 5,693	$ 2,384	$ 8,078
ERD Assistant	$ 5,457	$ 2,371	$ 7,828
Climate Resilience Research Manager	$ 3,795	$ 1,626	$ 5,421
M&E Manager	$ 124	$ 53	$ 178
M&E Officer	$ 2,831	$ 911	$ 3,742
Benefits	$ 7,526	$ 3,102	$ 10,628
Program Supplies & Materials	**$ 371,696**	**$ 342,330**	**$ 714,026**
Activities	**$ 358,795**	**$ 336,745**	**$ 695,539**
Community Sensitization	$ 1,294	$ 555	$ 1,849
Climate Messaging Partner Stipends	$ 15,695	$ 9,727	$ 25,423
Cash Transfer Service Charge	$ 1,657	$ 1,583	$ 3,240
Cash Transfer	$ 340,148	$ 324,880	$ 665,028
Monitoring and Evaluation	**$ 2,422**	**$ 1,456**	**$ 3,878**
Inception Phase Assessments	$ 681	$ 292	$ 972
Post-distribution Monitoring	$ 477	$ -	$ 477
Data Collection	$ 556	$ 456	$ 1,012
Project Visibility Supplies	$ 709	$ 709	$ 1,418
Other	**$ 10,480**	**$ 4,129**	**$ 14,609**
Hall Rentals for Meetings	$ 295	$ 126	$ 422
Refreshments for Meetings	$ 238	$ 102	$ 339
Transport Refund for Beneficiaries	$ 674	$ 289	$ 963
Smart Cards and Procurement	$ 382	$ 164	$ 546
Climate Messaging Supplies	$ 1,451	$ 9	$ 1,460
Vehicle Rental	$ 2,765	$ 1,436	$ 4,201
Office Supplies	$ 4,674	$ 2,003	$ 6,678
Travel	**$ 8,877**	**$ 6,501**	**$ 15,378**
Domestic Flights	$ 3,021	$ 4,037	$ 7,057
Per Diem & Accommodation	$ 4,964	$ 2,082	$ 7,046
TU Travel	$ 892	$ 382	$ 1,275
Capital Assets	**$ 938**	**$ 402**	**$ 1,341**
Laptops	$ 938	$ 402	$ 1,341
SHARED COSTS	**$ 73,707**	**$ 63,416**	**$ 137,123**
TOTAL	**$ 503,988**	**$ 433,618**	**$ 937,606**
Cost per household (n=725 per group; n=1450 total)	**$ 695**	**$ 598**	