LAYING THE FOUNDATIONS FOR MEASURING RESILIENCE

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BRACED KNOWLEDGE MANAGER

Working paper

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ACKNOWLEDGEMENTS

This document was written by David Wilson and Dr Gil Yaron with welcome input and critical review from Robbie Gregorowski and Katie Peters. The authors wish to acknowledge primarily the participation, engagement and enthusiasm of the three Implementing Partners involved in this evaluation activity, without which the work to date would not have been possible. In particular, this relates to inputs from Befekadu Ayele (Farm Africa, Ethiopia), Yigrem Kassa (Mercy Corps), Bhushan Shrestha (Plan International) and Manzo Aminou (Catholic Relief Services). We also recognise the contribution of the third-party providers commissioned by the Implementing Partners to conduct various aspects of the baseline studies. The technical support provided to the evaluation team and Implementing Partners by Statistics for Sustainable Development[1] was also extremely valuable. Finally, we would also like to acknowledge the engagement of and critical feedback received from DFID advisers during the design of the evaluation, which have greatly improved the quality of the evaluation and its outputs.

1 Formerly Statistical Services Centre, University of Reading: www.reading.ac.uk/ssc/index.php

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Acronyms

3As	Adaptation, Anticipation and Absorption
ATT	Average Treatment of the Treated
BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
CCA	Climate Change Adaptation
CRS	Catholic Relief Services
DFID	Department for International Development
DiD	Difference-in-Difference
DRR	Disaster Risk Reduction
EA	Evaluation Activity
FAO	Food and Agriculture Organization
ICF	International Climate Fund
INGO	International Non-Governmental Organisation
IP	Implementing Partner
KM	Knowledge Manager
KPI	Key Performance Indicator
M&E	Monitoring and Evaluation
MAR	Market Approaches to Resilience
MIMU	Myanmar Information Management Unit
MKE	Mekong Economics
NGO	Non-Governmental Organisation
SNNPR	Southern Nations, Nationalities and Peoples Region
SUR 1M	Scaling-Up Resilience to Climate Extremes for 1 Million People
VSLA	Village Savings and Loans Association
WFP	World Food Programme

Executive summary

This document provides insights and lessons learnt from designing and implementing the early stages of a quantitative impact evaluation for the UK government's Department for International Development (DFID) Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme. BRACED aims to build the resilience of more than 5 million people vulnerable to climate extremes and disasters and supports international, regional and local organisations, working in 15 consortia across 13 countries in East Africa, the Sahel and Southeast Asia. This impact evaluation is designed to answer the central evaluation question: *To what extent has household resilience increased as a result of BRACED interventions?*

The impact evaluation uses quasi-experimental methods and focuses on three of the 15 consortia in Ethiopia, Niger and Myanmar, each with slightly different designs and metrics. After introducing more about BRACED and the scope and purpose of this paper, we describe each country-level impact evaluation in more detail. While we are only at the stage of completing baseline studies, challenges faced in conceptualising and measuring resilience using quasi-experimental methods; developing appropriate indicators; and the practicalities of conducting such evaluations in challenging operating environments are highlighted. Baseline survey results from each project are further analysed and discussed in the context of laying foundations for detecting and quantifying changes in resilience as a result of project activities.

The key messages and lessons learnt emerging from the impact evaluations to date include:

1. Measuring and building resilience can be highly context-specific. Participatory processes and approaches used by Implementing Partner (IP) monitoring and evaluation (M&E) teams and evaluators have helped develop localised, context-specific interventions and indicators for composite index of resilience to enable effective measurement.

2. Projects use different indicators in composite indices for measuring resilience to climate shocks. These are context-specific and based on their conceptualisation of resilience and how they aim to strengthen it with their interventions. Some level of consistency and comparability is offered via the BRACED 3As (Adaptive, Anticipatory and Absorptive) capacity framework. The International Climate Fund Key Performance Indicator 4 outcome measure is a superficial measure of resilience as it reports only a number, but it offers a useful entry point and common understanding for IPs.

3. Climate shocks and stresses are dynamic and interpreted differently by different groups, including non-governmental organisation programme and field staff, evaluators, academics, government officials and households. Ensuring a shared understanding of what climate shocks are and how they are reported is critical in matching treated and untreated sample households.

4. The complexity of resilience-building requires IPs to understand and conceptualise resilience in order to design appropriate interventions. Many chose to combine individual interventions into packages to address the multidimensional nature of resilience. This means not only is it more difficult to measure (with potentially multiple causal pathways) but also it may take more time for changes to be detectable. Given delays in start-up, there are some indications that the current implementation period from 2015 to 2018 may be too short to allow statistically significant results to be detected through the impact evaluation in some cases.

5. Conducting an experimental impact evaluation would have been easier if it had been planned at the same time as the projects. This would have allowed for a cluster randomised control trial rather than the quasi-experimental approaches described here. However, the practical evaluation challenges described here remain the same, specifically constructing context-specific resilience indices; identifying pairs of communities that face similar climate shocks (Myanmar); and ensuring sufficient time to capture interventions (Ethiopia).

Introduction

Building Resilience and Adaptation to Climate Extremes and Disasters: An overview

The UK government's Department for International Development (DFID)-funded *Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED)*[2] programme is one of the most ambitious resilience-strengthening efforts globally. This initiative aims to help people become more resilient to climate-induced shocks and stresses in South and Southeast Asia, East Africa and the Sahel. Grants have been awarded to 15 consortia, a combination of international non-government organisations (INGOs) and local and international organisations known as Implementing Partners (IPs).

Understanding the extent to which these projects are able to strengthen the resilience of the households, communities and organisations they work with will be critical in ensuring successful approaches are scaled and replicated. With risks from climate-related disasters increasing and impacts set to plunge an additional 100 million people into poverty by 2030 (Hallegatte et al., 2016), it is an urgent imperative to understand what makes people, households, communities, markets, organisations and countries better able to anticipate, absorb and adapt to climate extremes.

Measuring changes in resilience is challenging, however, with still active debates about how best to define and conceptualise 'it' before being able to offer consistent and appropriate metrics for its measurement. Evaluation and research work conducted

2 www.braced.org

by BRACED's Knowledge Manager (KM)[3] represents some of the most advanced and ambitious attempts to meet this measurement challenge and offer insights into what works and what doesn't, for whom and why, when it comes to resilience-strengthening.

Quantifying and attributing changes in household resilience

All BRACED projects seek to increase the resilience of people vulnerable to climate extremes. This outcome is reported on for the International Climate Fund (ICF) Key Performance Indicator (KPI) 4 and is typically captured by a number of variables relating to types of assets, capacities and the ability of people to utilise these in the face of climate extremes.

However, the nature of resilience-strengthening activities and the fact that they are not operating in a vacuum, with outcomes potentially influenced by other (confounding) factors, make it difficult to attribute quantitative changes in the resilience outcome solely to a particular BRACED project or intervention. Simply comparing baseline and end of project data does not solve this problem, as the observed change may owe to project and external effects. What is missing is a counterfactual – the resilience indicator for project beneficiaries in the absence of the project – that would then enable the attribution of changes to BRACED interventions.

In an attempt to address the question of attribution, the BRACED KM has been working with three of the 15 BRACED consortia.

3 Download a leaflet that describes the BRACED KM further here: www.braced.org/resources/i/?id=c30ed2e2-0f5e-4f41-9959-72cd6077e230

These are: **Scaling-Up Resilience to Climate Extremes for 1 Million People (SUR 1M), Niger; Market Approaches to Resilience (MAR), Ethiopia; and BRACED Myanmar Alliance, Myanmar** (see Table 1 for further details). Together we have designed and begun to implement project-level impact evaluations to determine the extent to which household resilience has changed as a result of the project interventions. Known internally as Evaluation Activity 3 (EA 3), it is led by the KM working in close collaboration with the three IPs. Each IP has an impact evaluation designed to be relevant for the context in which it is operating, its implementation plans and the existing monitoring and evaluation (M&E) framework while offering some coherence across all three.[4] The next section summarises further details for each of these. They all involve a large sample household survey and quantitative calculations of changes in resilience as a result of project activities via different methods (BRACED KM, 2015).

Purpose of this document

This paper presents insights from these impact evaluations based on baseline household survey reports and reflections from IP staff and KM evaluators, as well as supplementary analysis of baseline data. It does not duplicate or seek to summarise the baseline reports each of the three IPs has produced but it does draw on the data therein and reference certain sections where relevant. This document does not aim to present evaluation *results*, as these will not be available until after the endline surveys are conducted. Rather, it offers a set of reflections, organised around key learning points documented and challenges encountered

4 Full details of the evaluation can be found in the BRACED KM Evaluation Plan (www.braced.org/resources) and detailed design document (available on request).

by both the evaluators and IPs in designing and implementing the impact evaluations. These reflections focus on the baseline household surveys, sample designs and analysis; designing appropriate measurement tools, including composite indices; and the practicalities of conducting quasi-experimental impact evaluations using large sample surveys in dynamic, challenging operating environments.

Note to the reader

This document is intended for a broad audience of those interested in resilience measurement from government and non-governmental organisations (NGOs), academia and M&E practitioners, as well as funders and commissioners of evaluations. It is also intended for other IPs within the BRACED programme that may be considering similar approaches for future resilience-strengthening projects under or outside of BRACED. All attempts have been made to explain technical concepts and avoid statistical or evaluation jargon, but some understanding of research and evaluation methods will be advantageous.

The document is organised into two further sections. The first provides a brief overview of the rationale, design and scope of the project impact evaluations. The subsequent section offers lessons based on the process of setting up the impact evaluations to date, including supplementary and exemplary analysis of the baseline survey results. These lessons are organised thematically and highlighted in boxes at the end of each sub-section.

1. BRACED PROJECT IMPACT EVALUATIONS

IMAGE:
MERCY CORPS

Purpose and scope

The BRACED project impact evaluation, referred to in the BRACED Evaluation Plan as EA 3, is one of five evaluations[5] led by the BRACED KM. This is in addition to those that IPs are mandated to conduct at midline and again at the end of the programme. EA3 is a set of three impact evaluations that use quasi-experimental methods to quantify changes in household-level resilience by comparing data from baseline and endline household surveys. Using individual project-level composite indices, we aim to measure changes in resilience for beneficiaries

5 Full details of EA 3 and the other evaluation activities can be found here: www.braced.org/resources

and will therefore determine whether project interventions have made a statistically significant difference to resilience over the period in question. We recognise that this could be positive, negative or neutral (i.e. no change). This will provide answers to the core evaluation question: *To what extent has beneficiary resilience increased as a result of BRACED interventions?*

To answer this question, the KM evaluation team has supported the three IPs to strengthen existing evaluation plans and will work with them in partnership to document and share the joint evidence generated about what works to increase resilience to meet the following objectives:

1. to document and identify lessons from the jointly developed project evaluation design and contribute to answering the overarching evaluation question;
2. to contribute to a body of knowledge on the conditions necessary and challenges to address in applying rigorous evaluation methodologies in the context of resilience strengthening interventions; and
3. to jointly develop and disseminate knowledge products (peer-reviewed working papers, guidance notes, policy briefs) emerging from this work.

This document is the first output from this work and has been developed with the input of each of the IPs.

Why use quasi-experimental methods?

A central issue in the design of these evaluations is that establishing cause and effect in a classic, linear sense – that is, intervention X results in observable effect Y (Stern et al., 2012) – is challenging given the complexity of the programmes and resilience as a concept. It is unlikely that a single cause (treatment/intervention) will lead to the desired outcome – that is, increased resilience; rather, it will be a combination of interventions in a 'causal package'. Moreover, the package of interventions available to beneficiaries within each project may differ. Therefore, we cannot simply make causal claims about how much of an observed impact owes to a particular intervention. What is missing are counterfactuals – what would have happened in the absence of the project. In this case, these are constructed via quasi-experimental methods that permit the comparison of matched individuals in control and treatment groups. This provides the basis for making causal claims about the change in participant's resilience. From a number of different approaches within the quasi-experimental 'family', the most appropriate was selected for each of the IPs, tailored to their specific delivery conditions and implementation plans. Table 1 presents a summary of the different designs, including approaches to sampling (design and size), as well as the different measurement indices.

"Establishing cause and effect in a classic, linear sense is challenging given the complexity of the programmes and resilience as a concept"

Table 1: Summary of different evaluation designs for each of the three Implementing Partners

	SUR 1M, NIGER	MAR, ETHIOPIA	BRACED MYANMAR ALLIANCE
Project description	SUR 1M builds resilience to climate extremes at scale through a gender-responsive, community-centred disaster risk reduction and climate change adaptation approach, fostering women's empowerment.	Market-based approaches to improve the resilience of vulnerable pastoralist/agro-pastoralist households to climate change. These will enable households, businesses and communities to better manage their resources and everyday risks.	Building the resilience of 356,074 individuals across three at-risk climatic zones through a combination of policy, action and media outreach, a diverse collaboration among local and international partners.
Project activities	Savings and internal lending communities; Climate-smart agriculture; Natural resource management trainings; Nutrition outreach; Land tenure support; Time-saving technologies; Value chain enhancement.	Village savings and loans associations; Increased access to finance for small businesses; Improved natural resource management; Improved weather and market information; Early warning systems; Access to mobile banking.	Integration of resilience into local and national planning processes; Early warning systems; Livelihoods/asset and ecosystem management; Village savings and loans associations; Microfinance.
Evaluation design	Comparing matched high-intensity vs. medium-intensity groups using a comparative baseline and endline household panel survey.	Comparing matched individuals from early intervention vs. late intervention *kebeles* (villages) using a baseline and endline panel household survey.	Matching procedures to compare individuals from representative baseline and endline panel survey from 'target' (treatment) and 'non-target' (control) villages.
Household survey sample design	Two-stage cluster sampling design. Stage 1: random selection of villages; Stage 2: systematic random sampling to select high- and medium-intensity groups from project database.	Stratified random sampling. Strata = region, late vs. early, livelihood group (agricultural, urban or agro-pastoral/pastoral).	Stratified random sampling (based on village size/agro-ecological zone); Spill-over effects controlled for via 2–5 km exclusion areas; 50% sample of female-headed households targeted.
Household sample size	1,800	2,200	2,400
Composite indices[6]	Capacity-based; Six dimensions based loosely on Scoones' Sustainable Rural Livelihood Framework.[7]	Different index for three different 'livelihood' groups; Five to seven indicators per index, with each indicator weighted.	Five dimensions with 30 indicators; Weighted at 15–30% at dimension level and equally within dimensions for each constituent sub-indicator.

6 Appendices 1–3 of this document presents each of the composite indices is fully presented.

7 http://www.ids.ac.uk/publication/sustainable-rural-livelihoods-a-framework-for-analysis

2. CHALLENGES AND LESSONS LEARNT

IMAGE: TOM CHEATHAM/ UNDP

Measuring resilience: moving from concept to practice

Conceptualising and measuring resilience

Resilience in human and socio-ecological systems is complex and challenging to define or measure, leading to still active debate about how best to do so (Béné et al., 2013; Cissé and Barrett, 2015; WFP 2014). Some consensus has emerged around the need to consider resilience an intermediate-level outcome – a means, not an end – that can protect development gains in the face of climate extremes (Béné et al., 2016). It is also widely accepted that measurement efforts should focus on the constituent capacities or abilities of the subject of study –

whether that be households, communities or government agencies – which can then be aggregated to offer insights into the relative level of resilience (Béné et al., 2015). This has led to the use of multidimensional composite indices or 'scorecards' with constituent indicators that reflect these different capacities, although many of these approaches are as yet untested. Finally, and perhaps most challenging, is that resilience can only truly be measured in the face of climate shocks and stresses. The uncertainty of frequency and severity of such climate events means that, in many cases, measurement tools will remain untested within the life of a programme, relying instead on assumptions, albeit well-evidenced ones.

The 3As: adaptation, anticipation and absorption

Following an extensive literature review, the BRACED programme has adopted a definition of resilience focused on three capacities: anticipatory, absorptive and adaptive – known as the 3As (Bahadur et al., 2015). This framework was shared with IPs after they had designed their projects and M&E plans and, while similar to their conceptualisation, it required adjustments to key documents and reporting processes. This is not a means of resilience measurement *per se*, but rather an analytical lens ultimately adopted by all IPs as a means of usefully organising their interventions and the outcomes they aim to achieve. In reality, most of the BRACED IPs, including the three involved in this evaluation, have mapped their existing indicators against the three capacities in the 3As framework rather than designing new ones in response to it. While this may be a somewhat reductionist treatment of the framework, it will offer some level of comparability across all projects. Furthermore, we will be able to analyse the results of the evaluation at the endline in terms of each of the three capacities using indicators from

the project-level indices to make statements about how each dimension of resilience has changed as a result of individual project interventions. Moreover, we will be able to offer some general statements about how resilience in each dimension has changed across all three projects, normalising and aggregating results for each.

International Climate Fund: KPI 4

Each project is also mandated by the funder (DFID) to report against ICF KPIs,[8] the most relevant of which for this evaluation is ICF KPI 4:[9] *Number of people with improved resilience as a result of ICF support*. Each IP will report a number against this indicator. The methods by which they arrive at this number vary, with some IPs using baseline, midline and endline household surveys, some using smaller panel surveys (that trace a subset of individuals surveyed at the baseline stage) and others using more qualitative measures. This variation and the aggregation of all findings to a single reportable number means KPI 4 alone will not offer sufficient insight into what works to strengthen resilience or even whether changes have benefited different groups in different ways. We have used KPI 4 outcome measures as an entry point with the three IPs, each of which had a list of indicators or scorecard in place to measure resilience changes for this purpose. Indeed, we use 'KPI 4' or 'KPI 4 index' interchangeably with the specific resilience measurement indices each IP uses. Under this evaluation, these indices have been refined based on additional analysis working in partnership with each of the IPs.

8 www.gov.uk/government/uploads/system/uploads/attachment_data/file/253682/ICF-KPI-summary.pdf

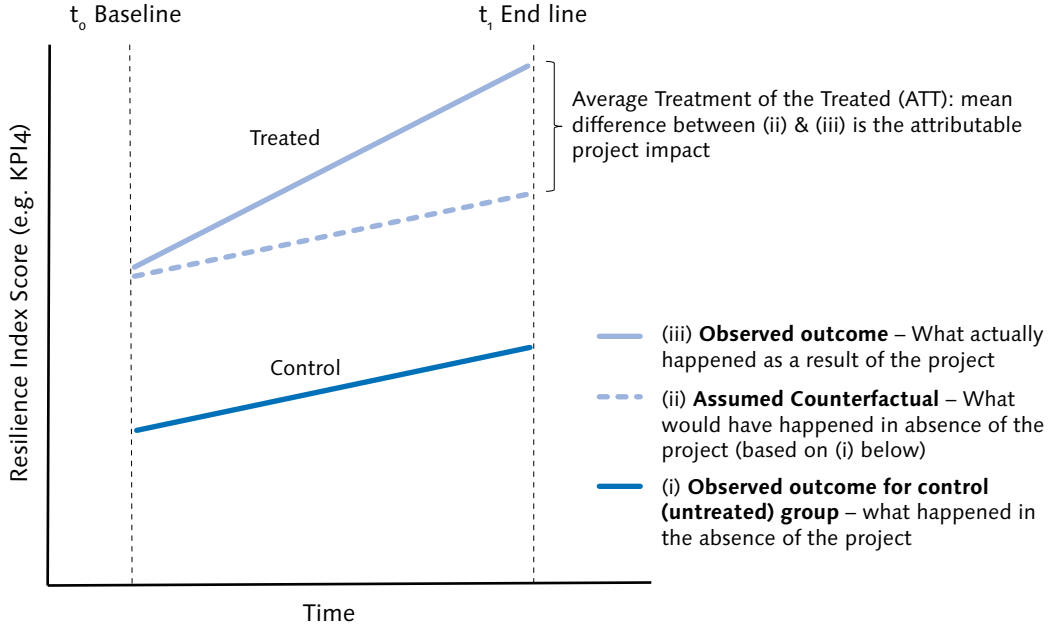
9 www.gov.uk/government/uploads/system/uploads/attachment_data/file/328254/BRACED-KPI4-methodology-June2014.pdf

In this way we aim to go beyond 'headcounts' to offer more nuanced and rich analysis of data generated through the course of this evaluation.

Using difference-in-difference impact evaluation design for resilience measurement

In principle, as Figure 1 shows, a difference-in-difference (DiD) design allows us to compare the change in the resilience index score for those receiving project interventions (in technical terms 'treatment' communities) with those not receiving interventions at all, or receiving fewer, less targeted or intensive, interventions (i.e. 'control' communities).

Figure 1: Generalised schematic showing DiD estimation of resilience



Source: Authors.

Under certain conditions, this approach quantifies the average effect of the project interventions on those individuals receiving them, also known as Average Treatment of the Treated (ATT). This works by comparing the change in resilience scores between baseline and endline for those in treatment and control communities. This removes unobservable individual effects and common macro effects. Although this approach has not been widely used for climate resilience programmes before – with some notable and recent exceptions (see FAO, 2016) – it has been widely used to capture the impact of social programmes (Blundell and Costa Dias, 2000; White and Sabarwal, 2014).

The DiD approach relies on two critically important assumptions: (1) of common time effects across groups – that is, the trend being the same for treatment and control groups (lower dark blue line and blue dotted line in Figure 1) – sometimes called the 'parallel trends assumption'; and (2) no composition changes within each group. Surveying the same people at baseline and endline using a panel survey meets the composition assumption but the parallel trend assumption requires control and treatment communities to face very similar climatic and policy changes – a much bigger assumption. We have also faced a number of practical evaluation challenges resulting from the broader programme design and the ways each project has been implemented. The way we have attempted to overcome these challenges provides useful learning, discussed below.

Identifying an appropriate sample: the importance of climate shock data

For the BRACED Myanmar Alliance consortia, the sampling process for the selection of the control groups involved creating an exclusion zone of 2 km around each target community to prevent contamination from the target (treatment) to the

non-target (comparison) villages via spill-over effects from the project interventions. In addition, comparison control communities are restricted to a 5 km radius of the target village, as the project and evaluation team assumed, in the absence of household data for each, that villages within this range share similar characteristics.

Based on these two conditions, potential control communities were identified from within this 2–5 km belt, using Myanmar Information Management Unit (MIMU)[10] maps. A matching control community was then selected that was a similar size to the treatment community and had received either 'low' or 'high' levels of historic project interventions across infrastructure, housing, agriculture, livestock, health, education, forestry, energy/electricity and access to finance.

However, in practice, analysis and triangulation of baseline household and village key informant data revealed that not all matched treatment and control communities were reporting the same climate-related shocks or stresses. This reflected the type of climate shock: cyclones invariably affected both communities in the same 2–5 km belt but flooding and droughts occasionally did not.[11] As a result, six of 68 villages surveyed were replaced by alternate control villages in the 2–5 km belt that had matching shocks. This required additional data collection after the main baseline had been undertaken. Of course, the past is not a perfect guide to predicting the future as far as climate shocks are concerned, but in terms of a quasi-experimental design it is an important consideration.

10 www.themimu.info/

11 Villages were also matched on severity of shock to avoid comparing villages that had reported 'mild' with those reporting 'severe' flooding or drought.

Box 1: Learning points for identifying climate shocks

1. Use key informant interviews to do first stage matching but triangulate village and household questionnaires to reduce the risk of 'elites' underreporting shocks that largely affect marginalised groups.
2. Do not assume nearby villages will all share the same shocks and allow time and resources for multi-stage sampling.

Resilience measurement indices: different tools and metrics

Identifying and testing measurement thresholds for resilience indices: the MAR Ethiopia experience

In the MAR project (Ethiopia), Farm Africa and Mercy Corps[12] project staff together with LTS International[13] and supported by the KM evaluation team, ran a validation workshop in Addis Ababa in May 2016 to discuss and agree the key variables from the baseline survey that would be used as weighted indicators in their KPI 4 resilience index.

Different combinations of variables were identified for different livelihood groups with which the project will work – sedentary agriculturalists ('farmers'), pastoralists or agro-pastoralists

12 Mercy Corps is one of the lead consortium partners for the MAR Ethiopia project and leads the delivery of interventions in two regions (SNNPR – Arba Minch and Somali).

13 LTS International is the M&E partner for the MAR Ethiopia programme and works closely with the consortium members and the BRACED KM evaluation team.

and urban or peri-urban households. Table 2 presents the initial resilience index for agricultural households in Southern Nations, Nationalities and Peoples Region (SNNPR). This includes the indicators, thresholds and mean scores from the baseline data. In this version, thresholds were set for asset values and savings based on field and other programme staff views of what would be required to build climate resilience. The maximum KPI 4 or resilience score would be six and the actual value from baseline data for this specific group was 1.608.

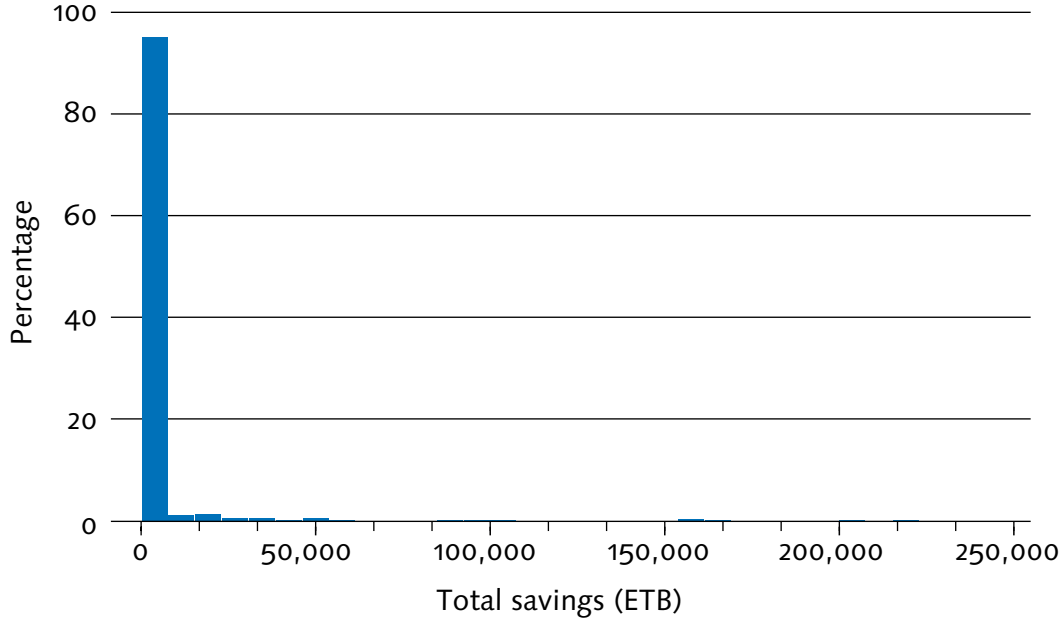
Table 2: Initial resilience measurement index proposed by the MAR team for agricultural households

DOMAIN	INDICATOR	TOTAL AVAILABLE SCORE	MEAN SCORE FOR SNNPR HOUSEHOLDS AT BASELINE
Savings	>ETB 5,000	1	0.086
Traders	>1 trading connection	1	0.275
Insured	Insured (Y/N)	1	0.008
Assets	>ETB 10,000 (crop + livestock)	1	0.316
Information	Improved crop/livestock productivity (Y/N)	1	0.539
Management	Watershed management benefited household (Y/N)	1	0.383
Total		6	1.608

Source: Adapted from LTS International workshop presentation based on baseline data.

This shows that very few households (<9%) have savings greater than ETB 5,000.[14] Workshop discussions among field and programme staff subsequently led to the reduction of the threshold to ETB 3,000. However, additional analysis of the baseline data presented here in Figure 2 shows that the distribution of savings at baseline is highly skewed towards the lower end. The median value of savings is zero and less than 15% of households would reach this lower threshold (ETB 3,000) for resilience at baseline.

Figure 2: Total ETB savings of farming households in SNNPR at baseline

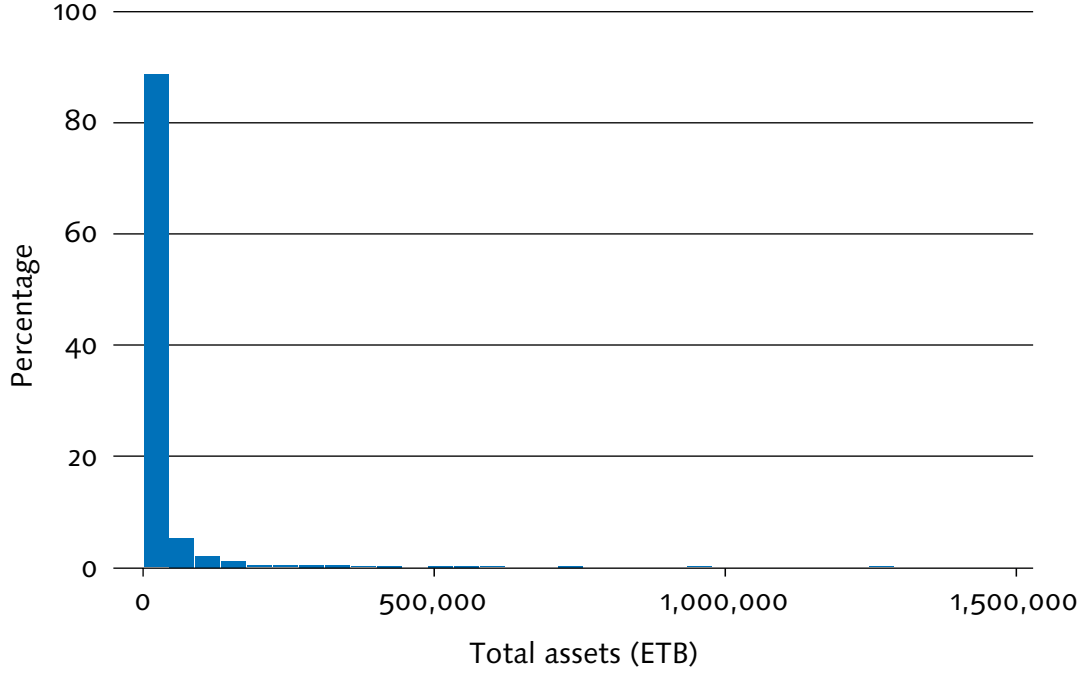


Source: Authors' analysis of baseline survey data for SNNPR.

14 At the time of writing $1 = ETB 22 based on a one-year mean figure.

The distribution of total productive assets (household assets, livestock and crop-related assets) for these households is slightly less skewed – as Figure 3 shows. Nonetheless, the median value for total productive assets is ETB 3,007 and 70% of households would start below the ETB 10,000 resilience threshold originally proposed for this variable.

Figure 3: Total ETB asset value of farming households in SNNPR at baseline



Source: Authors' analysis of baseline survey data for SNNPR.

Participatory field validation

In May 2016, the evaluation team joined project field staff to visit a farming *kebele*[15] in SNNPR.[16] This provided an opportunity to observe the primary intervention proposed to increase savings – a new village savings and loans association (VSLA) – and estimate the likely increase in savings as a result.

These 25 VSLA members described themselves as having below average levels of income for this *kebele* and saw this as a rationale for forming the VSLA. Their description of and objectives for the VSLA are consistent with the project's theory of change:

1. Savings made each week – ETB 10 towards loans and ETB 2 for a social emergency fund – would enable them to cope better with climate shocks. An income dividend of approximately ETB 12 per member would also be received at the year end from loan interest of 5% month (this will exceed the loan interest paid if there is only one loan for half of VSLA members at twice the value of savings per year).

2. Loans made to VSLA members (after the first three months of savings) would be used for income-generating activities (examples of poultry-trading and weaving were given), raising and, in some cases, diversifying income. As loans have to be repaid in three months and are twice the value of savings on average, half the group will each get loans of approximately ETB 240 (at 5% interest per month) in the first year.

In order to illustrate the time it would take for this VSLA to increase the proposed KPI 4 resilience measure, we assume that loans produce returns of 30% over a three-month period. This

15 A *kebele* is the smallest political unit in Ethiopia, like a village.

16 Geta Kanchera *kebele*, close to Arba Minch, SNNPR.

could be optimistic as it implies that those with VSLA loans get a return double the cost of borrowing. Nonetheless, on this basis, we have:

For the 13 VSLA members who get loans in Year 1

- Additional business income = **ETB 36** (ETB 240 loan x 30% return – 15% interest cost)
- Additional income dividend paid by VSLA at the end of Year 1 = **ETB 12**

For the 12 VSLA members who do not get loans in Year 1

- Additional income dividend paid by VSLA at the end of Year 1 = **ETB 12**
- **Savings** for all VSLA members = ETB 40/month = ETB 480 in the first year

GETA KANCHERA VSLA MEETS TO DEMONSTRATE HOW THEY MANAGE THEIR GROUP'S FUNDS. IMAGE: DAVE WILSON

These are only estimated calculations based on discussions with one group. They suggest, though, that even VSLA members who get loans in the first year are unlikely to add sufficient savings to move beyond the resilience index threshold of ETB 3,000 – even if all additional business income is saved. They start well below the threshold (typically with zero cash savings) and need to save thousands of birr to reach the threshold but VSLA membership will add less than ETB 530 in Year 1. It would take quite a number of years to save the threshold value originally proposed for this component of resilience.

Furthermore, there will only be four VSLAs in Year 1 in this *kebele* – that is, 100 people out of the 5,600 in the *kebele*. With an average household size of approximately 5.6, there would be 1,000 households in the *kebele*. If a household only has one VSLA member, only one in 10 (10%) of households sampled in the *kebele* will be VSLA members in Year 1. This implies that, *even if* VSLA membership did produce enough savings to reach the saving threshold for *some* VSLA members, it will be difficult to detect as nine out of 10 people in the sample are not VSLA members. This is not a criticism of using VSLAs as a resilience-building intervention but illustrates the importance of building scenarios to calculate what can realistically be achieved in the design stage.

In light of our evidence and following subsequent discussions with project staff, LTS International and the IPs have revised the index for calculation of KPI 4, replacing absolute thresholds for savings and assets with target increases of 15% from the baseline value (see Appendix 1). This seems to reflect the desire for an achievable and measurable target but not the targets agreed in the workshop. The total resilience score was revised from six to 10 to allow for a greater variety of responses and an improved ability to detect smaller improvements in resilience over the short lifetime of the programme.

Box 2: Learning points from MAR Ethiopia

1. The process of using simple field evidence to produce quantitative estimates of likely project impact on core components of resilience is very useful. Ideally, this should be done at the project design stage to give a sense of what can realistically be achieved over the project lifetime, but revisiting this after baseline survey or other 'critical moments' is also useful.

2. Our analysis reveals a gap between what IPs believed were appropriate thresholds for key components of climate resilience indices and what the M&E partner identified as an achievable target in the time available. As KPI 4 guidance does not require the measurement of absolute resilience but rather of aspects that can be affected by the project, both are legitimate objectives. However, they have very different implications for what the index actually measures.

3. The project will need to track how assets and savings relate to climate resilience to explain what thresholds for these variables should be for the index to be an effective measure of climate resilience in this case. This is likely to be an issue for KPI 4 or resilience measurement in other BRACED projects that use absolute thresholds for components of their indices.

4. The distribution and inequality of asset holdings that contribute to climate resilience is likely to have a major impact on KPI 4 measures. The notion of a climate resilience threshold is an under-researched area and one that could be further explored under BRACED.

SUR 1M, Niger: an adapted sustainable livelihoods framework for resilience measurement

In Niger, under the Catholic Relief Services (CRS)-led consortium, SUR 1M, the resilience measurement index is oriented around seven dimensions, or livelihood capitals. The index is similar to the Sustainable Livelihoods Framework (Scoones, 1998) but adapted to be specific to resilience as an outcome measure. Appendix 2 provides a summary of the index, with sample indicators that will score between one and three (low, moderate and high) using data from the household survey. The project will count the number of people in the sample showing a net improvement in at least one resilience dimension. It will then subtract the number showing a net deterioration across the seven dimensions to arrive at a final count.

> "The fact that the project is able to track and trace individuals and, at the project end, identify them and the activities they have joined is critical to being able to determine which groups to compare"

The index is linked to monitoring climate data from the regional climate service (AGRHYMET)[17] to provide data in the context of climate shocks and stresses. This is also linked to an early warning system that uses predetermined thresholds to indicate whether the communities are in moderate critical or extreme food insecurity. This allows the resilience scores to be presented in the context of climatic factors.

17 www.agrhymet.ne/eng

The project also has an advanced and sophisticated way of tracking participants, which activities they joined and when. Each participant in the project is issued with a unique reference and card, which they present when interacting with the programme and its staff. This is then scanned or recorded so that the programme staff can determine who participated in which activity and when. This is extremely valuable in the context of the resilience-building activities as many of them rely on self-selection. This means that the project targets an area, a set of villages for example, but does not have prior knowledge of precisely which individuals or households in each will choose to take up the activities on offer. This poses challenges for planning and designing an evaluation, in particular for sampling – who to survey and how to track them between rounds of surveying. The fact that the project is able to track and trace individuals and, at the project end, identify them and the activities they have joined is critical to being able to determine which groups to compare.

There are limits to this system, however, in particular when there is a climate shock or stress. One coping mechanism project participants use that programme staff noted is to leave their homes and relocate. For pastoralists this is a normal response in the face of resource (e.g. grazing fodder) scarcity but it was also noted for more sedentary agriculturalists, who may relocate to an urban centre in search of alternative livelihood options or to leverage existing social or familial networks there. While this is anecdotal, this is a logical response, and a particular challenge when employing panel surveys that require that at least a sample of baseline survey respondents be re-contacted at the endline survey. Impact evaluations, including this one, are designed to account for attrition (respondents 'dropping out' between survey rounds) but this type of 'shock-driven attrition' may require the use of higher estimates.

Box 3: Learning points from SUR 1M, Niger

1. Building on what is already there: rather than designing a completely new measurement framework, the evaluation team worked with the IP to build on what they already had in place based on their own interpretation of resilience.

2. Putting results into context: critical to understanding the results of the evaluation will be the climate context – did a shock occur within the project period? How severe was it? Is it likely to have affected the observed results?

3. Having a means of tracking project participants over the course of the project is resource-intensive but, given the transitory nature of many of the pastoral communities, particularly in the Sahel, this sort of approach will be critical in being able to compare results between the beginning and the end of the project.

4. 'Shock-driven attrition': a typical shock response employed by climate-vulnerable households may be relocating and thus leaving the project area. For impact evaluations that use panel surveys – interviewing the same people at baseline and endline – this will make it challenging to find the same respondents. Impact evaluations will need to consider including higher attrition estimates in sample size calculations or budget for resources to track and trace respondents who relocate.

Using perception-based indicators in the BRACED Myanmar Alliance project

The BRACED Myanmar Alliance theory of change sets out five 'dimensions of change' for climate resilience. This formed the basis for constructing the KPI 4 resilience measurement index, and the IPs selected 30 variables across these dimensions. This was reduced from an initial longlist of 90 based on a combination of expert judgement and consultation with project staff and communities. The five dimensions and their relative weights are shown below, with constituent indicators provided in Appendix 3:

1. increased resilience system and livelihoods (weight 30%)
2. access to communications, access and use of information (weight 20%)
3. increased preparedness and coping mechanisms (weight 20%)
4. improved safety nets (weight 15%)
5. improved decision-making and planning (weight 15%)

VOLUNTEERS BUILDING A CULVERT TO MAINTAIN ACCESS TO SCHOOLS AND MARKETS DURING TIMES OF FLOOD, MAWLAMYINE, MYANMAR. IMAGE: DAVE WILSON

Translating these into an appropriate resilience measurement index required a number of considerations:

- Whether some dimensions are more important than others for climate resilience: the BRACED Myanmar Alliance assigned consultants – Mekong Economics (MKE) – to implement the baseline study. MKE conducted 16 focus groups with beneficiaries in three climatic zones and in-depth discussions with 14 programme staff and stakeholders. As a result, a longlist of possible indicators was identified and weights from 15% to 30% were given to each dimension. Within any particular dimension all indicators are treated as equally important.[18]

- How to capture survey data for these indicators? The BRACED Myanmar team decided to use perception indicators (e.g. do you have savings?) rather than trying to measure continuous variable values (e.g. amount of savings in US dollars) and set thresholds. Questions were a mix of a simple yes/no (e.g. does anyone in the household have savings?) and Likert scales (e.g. have you participated in developing the village disaster/climate/resilience plan? 1 No 2 A little 3 A lot 4 Fully).

- How to score answers to these questions? BRACED Myanmar Alliance used a range of -1 to 1. A 'no' response scored 0 and the maximum positive answer scored 1, with linear interpolation[19] in between. A limited number of questions allowed a negative response (e.g. the household condition

18 This could potentially be changed at a later date (e.g. using focus groups to score the importance of indicators) and this would generate a revised KPI 4 measure from the existing baseline data.

19 www.encyclopediaofmath.org/index.php/Linear_interpolation

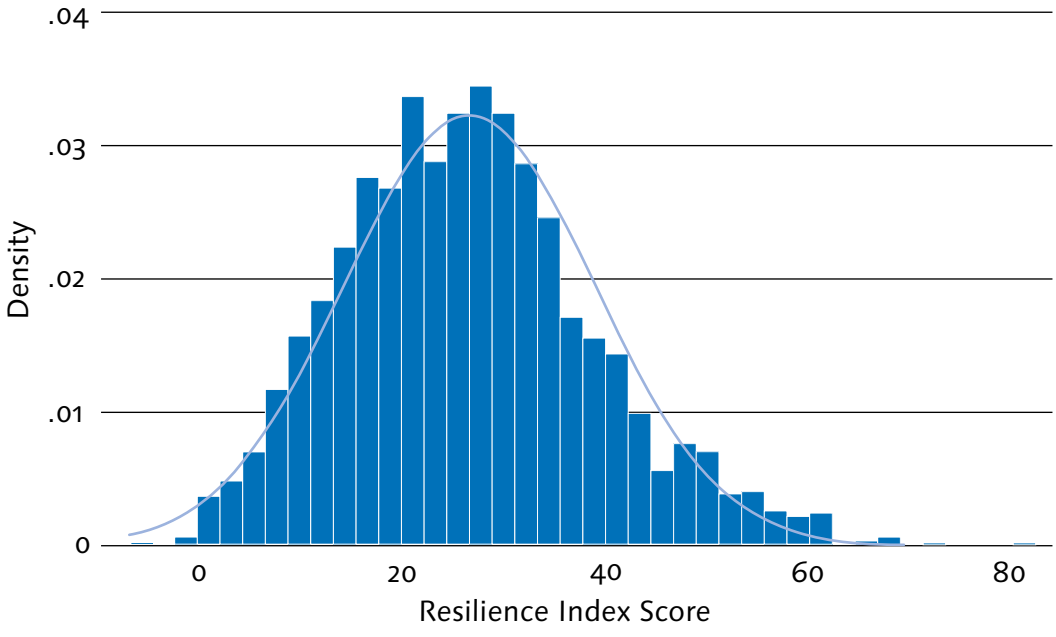
for a particular variable had deteriorated since the previous shock) and this was scored as -1. 'Don't know' responses are excluded so that a household's resilience score depends on the number of questions where they provide an answer.

Responses to the questions in the household survey are converted to scores between -1 and 1 and then these are totalled and standardised by converting into a score up to 100 (essentially a percentage) across all 30 indicators. A score of 100 would indicate very high resilience and a score of 0 (or in some cases minus scores) would indicate very low levels of resilience.

> "The effect of a large number of equally weighted indicators within each of the five dimensions and limited correlation across all indicators is to 'smooth' the KPI 4 estimate"

The effect of a large number of equally weighted indicators within each of the five dimensions and limited correlation across all indicators is to 'smooth' the KPI 4 estimate. As the histogram in Figure 4 shows, there is some 'skewness' to the KPI 4 distribution, with more than half of households below the mean KPI 4 value (the peak of the fitted bell curve). To illustrate the effect of using equally weighted indicators, the distribution for KPI4 in BRACED Myanmar communities is significantly less skewed than household expenditure is for Myanmar as a whole (Schmitt-Degenhardt, 2013: 7).

Figure 4: Myanmar baseline data KPI 4 histogram



Source: BRACED Myanmar Alliance Baseline Study, MKE (2016)

"The KPI 4 score is higher for male-headed than for female-headed households but there are some townships (Hpa-an, Kyauk Phyu and Taungup) where the reverse is true"

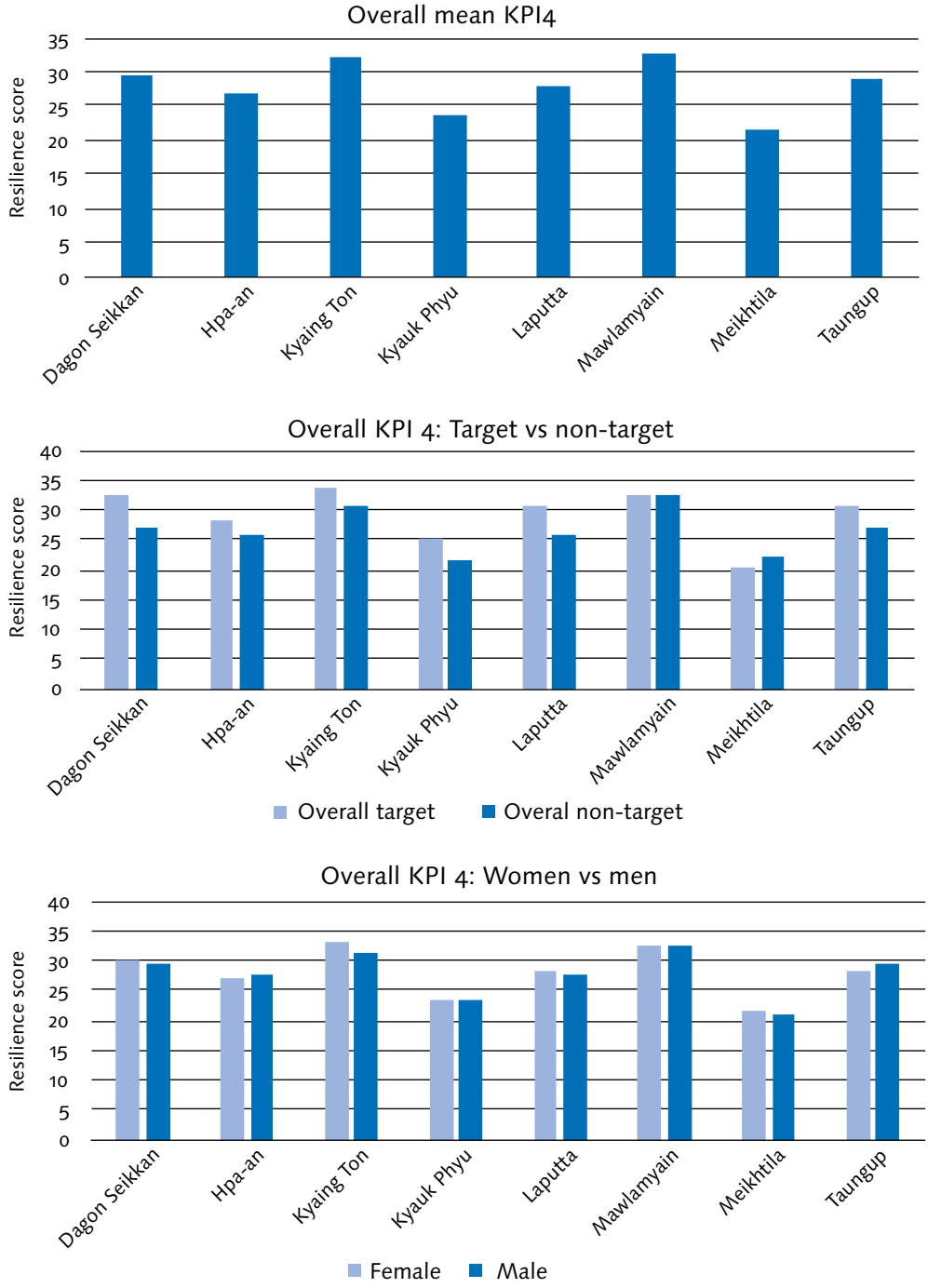
Figure 5 summarises the overall mean KPI 4 scores disaggregated by township, gender and target (treatment) versus non-target (control). There are observable differences in mean KPI 4 scores across townships – with baseline resilience levels in Mawlamyine 35% higher than those in Meikhtila for example. Overall, the KPI 4 score is higher for male-headed than for female-headed households but there are some townships (Hpa-an, Kyauk Phyu

and Taungup) where the reverse is true. The overall KPI 4 score is also higher for all townships in the target households than for those in non-target households with the exception of Meikhtila. This final observation is of note and suggests that the starting point for households not targeted by the project is on average lower in terms of resilience. This could be a reflection of factors unique to those households or it may indicate a source of systematic bias in which targeted villages have benefited from historical support and assistance that have already built aspects or dimensions of resilience and are reflected in a higher score.

"The overall KPI 4 score is also higher for all townships in the target households than for those in non-target households with the exception of Meikhtila"

It is important to note that the data presented here are an average baseline measure and do not therefore tell us anything about how the project might affect the resilience scores in these townships, nor about the factors that might enable or constrain them. It will be of great interest to compare these scores with those at the endline to determine whether and to what extent they have changed and whether the relative differences between townships remain the same.

Figure 5: Summary KPI 4 scores by township, target vs. non-target and gender



Source: Authors based on BRACED Myanmar Alliance Baseline Study, MKE (2016 Table 100, page 119).

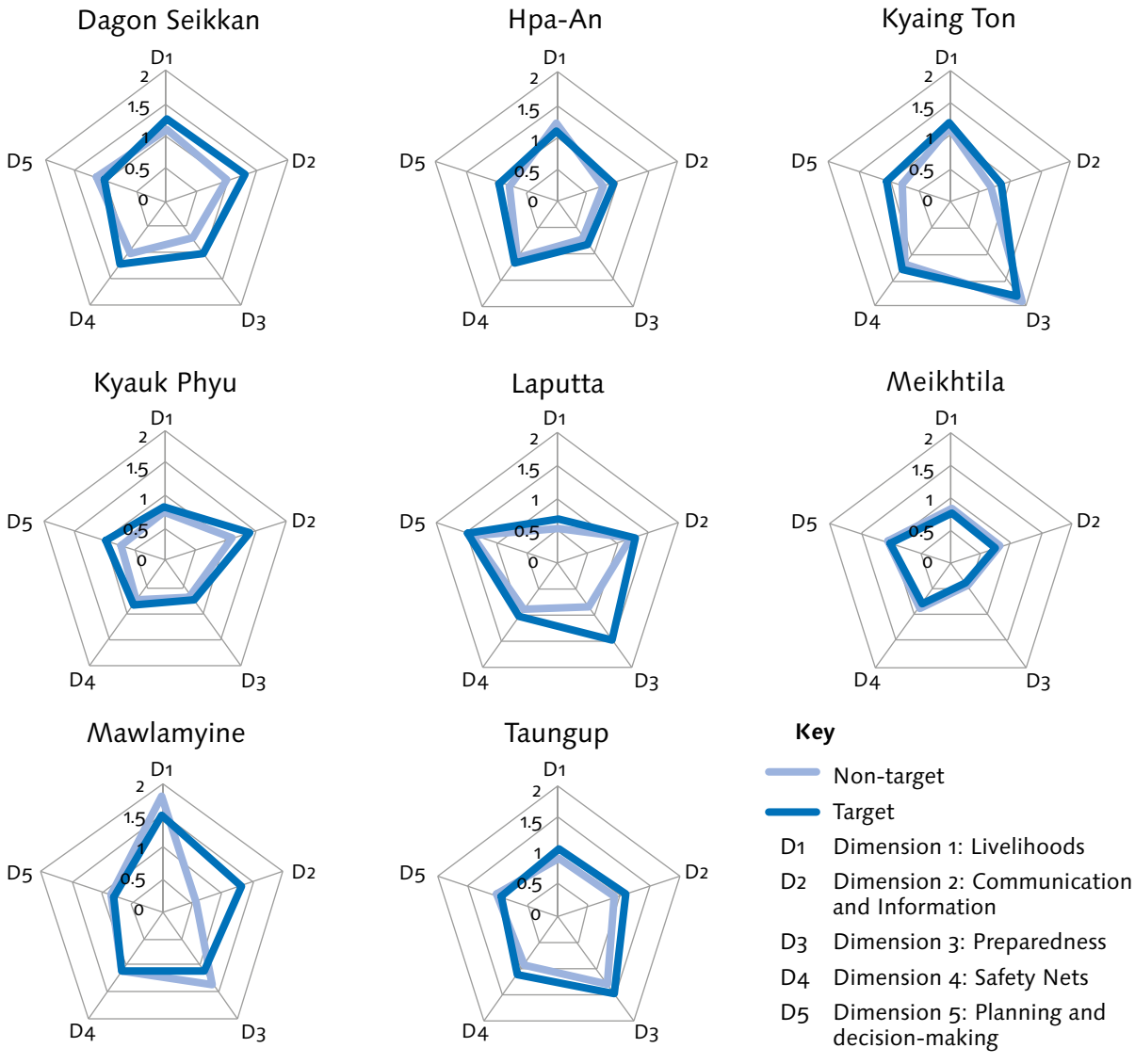
Dimensions of resilience

Perhaps the most interesting variation is the relative strengths and weaknesses of the townships in terms of each of the five dimensions of climate resilience captured by the KPI 4 indicators and shown in Figure 6. For example, we can see that households in Mawlamyine and Meikhtila have similar levels of improved safety nets, decision-making and planning and access to communications and information but those in Mawlamyine have much higher scores for dimensions 1 and 3: 'Increased resilience system and livelihoods' and 'Increased preparedness and coping mechanisms'. We have seen from the summary KPI 4 data described earlier that there is an observable difference between target and non-target households at baseline. This is further illustrated in Figure 6, which also emphasises the difference between each group by resilience dimensions – for example in Laputta, where target groups score much higher for dimension 3 (increased preparedness), and in Mawlamyine, where target groups score noticeably higher on dimension 2 (communications and information). It will be of interest to investigate the reasons for this and if this changes at the endline survey as a line of enquiry.

These snapshots of emerging data emphasise that, in order to learn from the project activities and help answer the questions of what works and what doesn't for resilience-building, the focus should not necessarily be on the final overall resilience score. There is a lot of rich detail in the resilience scores of different dimensions that should not be overlooked. For example, does having a low score in one dimension but higher in others, leading to an overall high score, mask some important factors? Conversely, if a household scores highly in one dimension, say safety nets in the form of savings for example, but low across all others, does this mean it is overall not a resilient household, or does it have access to the right resources to be able to cope in their

circumstances? For example, it may be that savings is the single most important factor for overall resilience. Exploring these data with such sub-questions in mind rather than simply reporting average numbers of increased people's resilience, will offer a deeper insight into what works for resilience-strengthening.

Figure 6: Township profile of each KPI 4 dimension (D1–D5)



Source: BRACED Myanmar Alliance Baseline Study MKE (2016, pages 123–5).

Box 4: How much is enough? KPI 4 and resilience thresholds

In analysing these data, the evaluation team was prompted to consider the question: *how much of a change in resilience is enough*? That is to say, should there be a minimum level of resilience that projects should be aiming to achieve for the beneficiaries of their activities, and if so what is it? Currently, projects are mandated to show net changes in resilience scores to report against KPI 4, but this is simply an aggregation of those households that have shown increased resilience scores and other matched households that are assumed to be the same. Often, average household sizes are then used to estimate individuals whose resilience has increased as a result of the project. However, this says nothing about how much resilience has increased, or from what starting point – an increase, however large or small, will lead to a household or person being included. For example, there may be some households that already had relatively high levels of resilience and that have seen a marginal increase in their scores. Meanwhile, there may have been a transformational change in those with lower scores. The worse scenario is that those with lower scores (perhaps the poorest with fewest assets) remain 'stuck' in a poverty-like trap (Sachs, 2005). The current KPI 4 measure may mask these important differences, leading to inaccurate recommendations about what has worked and what hasn't. The evaluation team is thus considering the possibility of using the data from this evaluation to explore the idea of a resilience threshold – the minimum required level to be able to call a household resilient. This is fraught with technical, practical and ethical challenges but is an as yet underexplored area in the literature that could be tested via this evaluation. Thresholds are not a new concept in resilience: they have been proposed and tested in literature related

to natural ecosystems – forests, coral reefs, mangroves etc. (Folke et al., 2004; Holling, 1973; Kinzig et al., 2006); but they are largely empirically untested for social or socio-ecological systems save for in a small number of recent attempts (Cissé and Barrett, 2015).

Comparison groups: are they the same?

The quasi-experimental design proposed by the independent evaluators and described earlier provides an opportunity to compare baseline values for KPI 4 in both treatment and control communities. Given that these communities are paired within township areas and are matched on climate characteristics, we expected to see very similar values. However, as Table 3 shows, this is certainly not the case. The difference between treatment and control means KPI 4 values are statistically significant at the 1% level[20] – that is to say that observed differences from the baseline survey are unlikely to be random and we can be confident they are 'real'. Our analysis suggests treatment communities have a particular advantage in dimensions 2 and 3: 'Access to communications, access and use of information' and 'Increased preparedness and coping mechanisms'. In other words, they are better informed and more prepared than non-target groups.

The most likely explanation (and one supported by evidence from the evaluation team's field visit in January 2016) is that IPs have selected BRACED sites in which they have already been working for some time. This reflects the high transactions costs of negotiating new sites with government and the opportunity to build on trust and relationships developed over a number of years.

20 The BRACED Myanmar Alliance Baseline Study – MKE (2016) – gives *p-value=0.000* rejecting equal means for the two groups.

Table 3: Myanmar KPI 4 mean values for treatment and control sites by dimension

	TREATMENT	CONTROL	% DIFFERENCE
Dimension 1 (Livelihoods)	8.81	8.48	4%
Dimension 2 (Communication/information)	4.99	4.02	24%
Dimension 3 (Preparedness)	4.28	3.71	15%
Dimension 4 (Safety nets)	7.17	6.57	9%
Dimension 5 (Planning/decision-making)	3.02	2.85	6%
Total KPI 4 Score	28.12	25.04	12%

Source: Authors, derived from BRACED Myanmar Alliance Baseline Study MKE (2016).

What do treatment and control differences at baseline mean for resilience measurement?

The starting difference in KPI 4 values should not pose a problem for the DiD approach estimates of project impact on KPI 4 as long as the advantages that the treatment communities have do not indicate a different 'resilience trend' relative to control communities. So, for example, if BRACED improves provision of weather forecast or risk information and this is found to increase resilience to climate shocks we would attribute the estimated effect to the project. However, the positive effect we observe over time compared with the control group may reflect having experience in using weather forecast information prior to the project as well as getting better information via the project. If the intervention was then replicated in the control group (without such prior experience), we are likely to see a much smaller benefit. In order to minimise this effect (known as sample selection bias), it will be necessary to use statistical techniques to match individuals that are similar across these five dimensions in control and intervention groups before comparing project

impacts over time. This adds some complexity to the analysis and the question remains as to whether BRACED has targeted the most climate-vulnerable sites.

Box 5: Learning points for resilience measurement indices

1. KPI 4 measures across BRACED projects are likely to vary substantially even though projects have followed common guidance notes. The Ethiopia and Myanmar examples in this paper draw on similar components of climate resilience. However, they vary in using levels of savings or assets, or simply in the existence of or changes in these variables. In addition, number of indicators, covariance between indicators, weighting allocated to indicators or clusters, use of perception indicators and scoring of answers are all likely to make a difference to KPI 4. Ultimately, projects will report the number of people whose resilience has increased but there is an argument for offering a more standardised index across all projects that is flexible enough to accommodate different contexts (see WFP, 2014 for one such example).
2. NGOs that have established good working relationships in project sites over a number of years have strong incentives to carry out climate resilience work in these areas. These established relationships may well lead to faster and bigger increases in resilience but there is a risk that they will not be working in the most climate-vulnerable communities.
3. There is value in disaggregating geographic differences in KPI 4 by component/variable to understand differences across areas. Both the Ethiopia and Myanmar cases have done this.

The time challenge

Is there enough time to observe changes?

BRACED project activities are scheduled to run until the end of 2017, and the endline household surveys for this impact evaluation are aligned to fit with this. However, many of the projects in BRACED, including the three discussed here, have experienced various delays in setting up and beginning implementation for reasons often beyond their control (delayed government permissions, acute climate shocks, security risks etc.). In Myanmar, for example, historic national elections delayed the planned baseline survey and therefore implementation work. This has led to increased risk that the period in which we can expect to detect statistically significant changes as a result of project activities (maturation effect) will be insufficient, in the worst case resulting in a 'null evaluation' – that is, not being able to say whether anything has changed. Not only does this represent an investment risk but also it may be misleading – changes may occur but, given the short time between survey rounds, these may not be detectable.

This was particularly the case in the MAR Ethiopia project, where the baseline study and implementation of activities was delayed owing to severe drought in the east of Ethiopia (Afar and Somali regions) as well as challenges in securing the necessary permissions from the Government of Ethiopia. This means that the period for effecting, detecting and measuring change has reduced from two years to less than 18 months. However, programme staff report that the maturation period after which effects from the intervention could be observed is 18 months minimum–30 months maximum. This means that late *kebeles* should receive the intervention 18 months after

the corresponding early *kebeles* (e.g. September 2017). According to revised implementation plans, all *kebeles* will receive some form of intervention by April 2017 at the latest, although this varies by type of intervention and region. In Arba Minch (SNNPR), for example, field staff expect to see VSLAs affecting savings after 18 months but early warning system effects only after 24 months and natural resource management impacts after 30 months. Given the delays, it appears that there will be inadequate time for these activities to produce a detectable change. Furthermore, owing to delays and challenges in receiving Government of Ethiopia permissions, the field teams (under pressure to deliver) began to implement activities in *kebeles* that had been designated 'late' or 'control' villages. This has compromised the fidelity of the sample design and jeopardised the feasibility of the impact evaluation.

> "For many of the BRACED countries, recurrent annual drought and heavy rains are a part of life and often lead to times of hardship and abundance, respectively"

In response to these emerging field realities, the evaluation team conducted a post-baseline rapid evaluability assessment to consider the issues of maturation period, sample integrity, estimate precision and statistical power to determine whether the impact evaluation can proceed as planned. This assessment involved reviewing planned versus actual implementation plans, meetings with programme staff, field visits and analysis of baseline data. It was determined that only if the project period was extended would the impact evaluation be viable as designed. This additional analysis has informed discussions around the

benefits of programme extension and at the time of writing looks likely to result in a reorientation of the evaluation to be more qualitative in nature. In this way, the evaluation is adapting with the project.

When to conduct the survey?

It may be important to consider not only the amount of time between conducting baseline and endline surveys but also what time of year – month or season – the surveys are conducted. For many of the BRACED countries, recurrent annual drought and heavy rains are a part of life and often lead to times of hardship and abundance, respectively. While these periods are becoming increasingly difficult to predict, owing to the effects of climate change already being felt, some effort should be made to align the timing of surveys to avoid introducing a source of potential bias. For example, if the baseline survey is conducted at the end of the dry season when agricultural communities are reliant on remaining surplus, this may indicate lower levels of resilience. If the endline survey is conducted towards the end of the rainy season or start of the dry season around harvest time respondents may report higher levels of food security. It is therefore important to consider the timing of the surveys and be aware of the climatic conditions. In reality, it may not always be possible to survey at the same time of the year. Therefore, any differences should be captured as possible influencing or confounding factors when presenting results.

Box 6: Retaining flexibility in light of operational realities

1. It is important to determine as early as possible whether there is sufficient time for an activity to have an effect and when to evaluate in order to detect any change. This is a consideration not only for future resilience measurement and evaluation but also for programme and project design. It is not a surprise that some interventions are likely to take effect only after the main project activities are concluded, and this should be considered when designing evaluations, for example to budget for ex-post (i.e. after programme completion) impact evaluations.

2. Revisiting theory of change assumptions: IPs indicated in their M&E plans, which included assumptions made in theories of change, that their activities would have an effect in the lifetime of the project. However, delays and changes in some cases mean these assumptions may not hold true. The importance therefore of revisiting the project logic or theory in light of changes to implementation plans cannot be overemphasised. This should be done at least annually but sub-annually would be preferable.

3. Adaptable and flexible programming: identifying challenges in implementation, assessing the implications and acting or adapting accordingly are central principles of adaptive and flexible programmes. Technically, these cycles of observing, reflecting, assessing and acting should be frequent (i.e. sub-annual) but this requires investment in monitoring that is currently beyond the scope of most IPs in BRACED. However, the exercise conducted with the MAR Ethiopia project demonstrates the value of punctuating delivery as planned with reflections and reassessment in light of delivery realities.

3. CONCLUDING REMARKS

IMAGE: ZERESENAY BERHANE MEHAR

Measuring resilience in practice is challenging. Approaches, metrics and tools are still being explored and tested. There is not and may never be a standardised approach. Using quasi-experimental methods to measure changes in resilience is one approach yet to be fully tested but that may offer some insight into the extent to which changes in household resilience are a direct result of project activities.

"Measuring resilience in practice is challenging. Approaches, metrics and tools are still being explored and tested. There is not and may never be a standardised approach"

Mandatory reporting under the ICF requires that a common comparator – KPI 4 – is used but the way it is measured differs by IP. To address this, the three projects described here have identified, selected and weighted indicators in a composite index. Such indices provide very useful summary results and findings. However, we need to look at the determinants of resilience at the household level; just looking at composite indicators is not sufficient. By drawing on the rich data from baseline (and planned endline) surveys there is the potential for not only quantifying changes in resilience but also deeper understanding of what the most powerful determinants for overall climate resilience are at the household level; for whom these changes are most pronounced; and the relative importance of different dimensions of resilience.

"There is the potential for not only quantifying changes in resilience but also deeper understanding of what the most powerful determinants for overall climate resilience are"

There are important lessons to be learnt already from applying this approach to measuring resilience, including the importance of characterising climatic shocks in order to ensure control and treatment groups are well matched; contextualising results based on these shocks and stresses; retaining flexibility to be able to adapt in challenging programming environments; and selecting indicators that demonstrate project impact. This paper has also highlighted the need to revisit assumptions made about project interventions and the pace at which they will effect change and what this means for future programming.

Building in opportunities to reflect on what is working and what isn't and over what timescale is an important learning point demonstrated by the examples given here.

The final evaluation, currently scheduled to be conducted at the end of 2017 and reported on in early 2018, will offer quantitative results for observed and detected changes in household-level resilience and allow us to say with a specified degree of confidence how resilience has changed for surveyed households because of project activities and interventions. We will be able to extrapolate results to represent all those benefiting from project interventions via statistical matching techniques. We will also be able to say how much resilience has changed for different sub-groups, for example women and young people, and offer insights into what the most important determining factors or predictor variables are for people's resilience in different contexts, whether it be savings, assets or access to information.

We have discussed here lessons learnt in laying the foundations for the final evaluation and for measuring resilience under BRACED more generally. If further lessons are to be learnt as to what works (and what doesn't) for strengthening climate resilience, then such open and transparent reflection to complement quantitative data will be required. We hope this represents one such contribution and look forward to offering future insights.

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Appendix

Appendix 1: Revised resilience measurement index proposed by the MAR team for agricultural households

	INDICATOR	SCORE OF 0	THRESHOLD VALUE (SCORE OF 1)	WEIGHTING	TOTAL SCORE AVAILABLE
1	Total productive assets (urban household, livestock and crop-related assets) (ETB)	Increase of less than 15% or decrease	Increase of 15% or more	2	2
2	Savings in a formal savings mechanism (ETB)	Increase of less than 15% or decrease	Increase of 15% or more	2	2
3	Management of your watershed has benefited your household	No management	N/A	2	2
4	Household has insurance related to crops or livestock	No insurance	Any insurance	1	1
5	ETB value of all crops sold	<5,000	5,000+	1	1
6	Access to and use of information have improved crop productivity or minimised shock effects	No access	Has accessed and used	1	1
7	Membership of a VSLA with a social fund (even if without savings – as a proxy for social capital)	Not a member	Member	1	1
Total attributable resilience score					**0–10**

Source: Adapted from LTS International (2016, Table 54: Resilience index – farming household).

Appendix 2: SUR 1M resilience index with sample indicators

DIMENSION (CAPITAL)	EXAMPLE INDICATORS
Spiritual and human	Number of individuals that practise a moderate to high number of these project-promoted techniques (SMART skills, natural resource management, climate-smart agriculture, use of climate information, nutrition).
Social	Individuals' level of engagement in community or local organisations (SILC, producer groups, EWGs, processing/ transformation group)
Political	Percentage of people who report that they have adequate information on dates of last municipality session; key activities in the annual commune action plan; total communal budget; and % external v. internal resources.
Financial	Value of households' livestock ownership (livestock ownership in the Sahel is a proxy for savings).
Natural	Number of people without land ownership who have engaged in the process of securing formalised land tenure for productive use (land tenure lease negotiations, full titles or charters that focus on herder/farmer land use) (as individuals or as members of collectives) (disaggregated by country and gender).
Physical	Average household production of millet, sorghum and cowpea.
Systems and structures	Men and women who believe they have adequate access to the following: microfinance including community savings and lending; health facilities; extension services (including but not exclusively agriculture, animal husbandry, rural land agents); mayors' offices; and schools.

Appendix 3: BRACED Myanmar Alliance resilience index with constituent indicators

1. **Increased resilience system and livelihoods (weight 30%)**
    - Have access to food
    - House remains safe
    - Access to basic health services
    - Access to safe drinking water in less than 30 minutes' walk from home
    - Stable or increased income
    - Access to water for irrigation
    - Diversified income sources in past 12 months
    - Tried at least one new variety of crops in past three years
    - Tried at least one new species of livestock in past three years
2. **Access to communications, access and use of information (weight 20%)**
    - Access to weather forecast/risk information
    - Used weather forecast/risk information to make key livelihood decisions
    - Access to early warning information for extreme events
    - Used early warning information during past extreme events
    - Increase assets to receive information (mobile, phone, radio, television)
    - Used weather forecast and climate information for village-level planning and decision-making
    - Awareness on root cause of climate change
3. **Increased preparedness and coping mechanisms (weight 20%)**
    - Prepared better able to cope with same last severe shocks
    - Specific plan to cope with when shocks come

- Access to safe evacuation place
- Participated in disaster preparedness drill/simulations

4. **Improved safety nets (weight 15%)**
    - Access to improved loan facility
    - Have savings
    - Access to external help
    - Have increased assets
5. **Improved decision-making and planning (weight 15%)**
    - Women's membership in local-level committees/group
    - Women's participation in local-level disaster/climate/ resilience planning
    - Children's participation in local-level disaster/climate/ resilience planning
    - Women's voices heard and included in local-level disaster/climate/resilience planning and implementation
    - Children's voices heard and included in local-level disaster/climate/resilience planning and implementation
    - Women's confidence about raising concerns to local committees or authorities

BRACED aims to build the resilience of more than 5 million vulnerable people against climate extremes and disasters. It does so through a three year, UK Government funded programme, which supports 108 organisations, working in 15 consortiums, across 13 countries in East Africa, the Sahel and Southeast Asia. Uniquely, BRACED also has a Knowledge Manager consortium.

The Knowledge Manager consortium is led by the Overseas Development Institute and includes the Red Cross Red Crescent Climate Centre, the Asian Disaster Preparedness Centre, ENDA Energie, ITAD, Thompson Reuters Foundation and the University of Nairobi.

The BRACED Knowledge Manager generates evidence and learning on resilience and adaptation in partnership with the BRACED projects and the wider resilience community. It gathers robust evidence of what works to strengthen resilience to climate extremes and disasters, and initiates and supports processes to ensure that evidence is put into use in policy and programmes. The Knowledge Manager also fosters partnerships to amplify the impact of new evidence and learning, in order to significantly improve levels of resilience in poor and vulnerable countries and communities around the world.

Published September 2016

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Cover image: Aubrey Wade/Panos
Designed and typeset by Soapbox, www.soapbox.co.uk

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