How mobile phones can be used to track people's views on resilience: key findings from Myanmar

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Resilience continues to dominate the international development agenda. With financial support towards resilience-building activities increasing in recent years, funders want to see impact and value for money.

Unfortunately, monitoring and evaluation of resilience is tricky. For a start, the definition of resilience is heavily contested, with hundreds of different measurement frameworks to choose from. More importantly, traditional resilience measurement is costly and time-consuming. Evaluations rely heavily on large face-to-face household surveys that can take hours to administer and are difficult to coordinate – particularly in conflict-affected or post-disaster areas.

As funders continue to demand cheaper, easier and more robust ways of measuring resilience, new ideas and innovations are desperately needed (COSA, 2017). It is here that the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme aims to provide new insights. As part of its Rapid Response Research (RRR) project in Myanmar, a number of unique innovations were trialled, allowing the collection of high-frequency data at a fraction of the cost of traditional surveys.

In this brief, we synthesise some of the main findings from the RRR project, highlighting strengths and weaknesses of the project's new approaches. While we provide quick highlights of each insight (there are eight in total), we encourage readers to delve into the more detailed working papers associated with each key finding (see Box 1 for more).

What makes the BRACED's RRR unique?

Before delving into lessons learnt from the RRR, it is important to consider what makes the project unique. Two key innovations were trialled. The first is use of mobile phones to collect remote survey data on resilience and disaster recovery (Jones, 2018). As huge growth in mobile phones access and usage continues across much of the Global South, new opportunities are opening up for collecting resilience-related information. Mobile phone surveys not only are cheaper (up to a third of the cost of face-to-face surveys) but also offer evaluators opportunities for near-real-time data collection. Importantly, they also allow for contacting and tracking individuals while they are on the move – crucial in post-disaster contexts where people often migrate out of badly affected areas.

The project's second innovation is to develop a new approach to measuring resilience based on people's own perceptions and judgements, which we call the Subjectively Evaluated Resilience Score (SERS). Traditionally, resilience has relied on objective methods – where resilience is defined and evaluated externally, typically guided by literature reviews or consulting with outside 'experts'. These inputs are then used in deciding how resilience is defined, how it should be measured and the objective indicators needed to track it (Jones, 2019a).

Yet objective approaches often miss an important source of knowledge: the wealth of information people have of their own resilience and capabilities. Subjective evaluations seek to capture just that. They factor in an individual's insights into their ability to deal with risk by measuring perceptions, judgements and preferences (Clare et al., 2018). Another advantage of subjective evaluations is that they are far shorter than objective approaches (typically three to five minutes in length). This not only helps reduce the burden of long surveys but also lends subjective evaluations to being administrated via mobile phone surveys.

SERS is administered by asking a series of resilience-related questions that are then used to calculate a single score for every household. Evaluators are able to adapt the types of questions used in calculating the SERS based on how they wish to characterise resilience. Scores range from 0 (not at all resilient) to 1 (fully resilience). For more details on how to carry out the SERS procedure see Jones (2019b).

The RRR brings together these two innovations to look at how disasters affect households in eastern Myanmar. As part of the project, resilience-related information from 2,000 households was tracked before and after heavy monsoon flooding across two research sites in Kayin state – Hpa An and Mudon.

Cheap and timely data collection meant the RRR was able to gather high-frequency panel data, with surveys conducted every two months – a feat that would have been prohibitively expensive using face-to-face surveys. In total, 16,300 individual surveys were collected over 15 separate rounds of surveys between June 2017 and March 2019. This wealth of information provides invaluable insights into the nature of how resilience changes over time.

Below we synthesise the RRR's main contributions to our understanding of resilience, as well as guidance on how to use mobile phones and subjective measures for those looking to adopt them. We break these findings down into eight critical insights. Each sheds light on the merits and feasibility of combining mobile phone and subjective survey for resilience evaluations.

Box 1: RRR working papers

Further details on the RRR can be found in the wealth of published materials below (see reference list for full details).

For an overview of the RRR's approach see 'New methods in resilience measurement: Early insights from a mobile phone survey in Myanmar using subjective tools'

For insights into tracking resilience over time see 'How does resilience change over time? Tracking post-disaster recovery using mobile phone surveys'

For more on subjective-evaluations see 'A how-to guide for subjective evaluations or resilience'

For more on mobile-phone evaluations see 'A how-to guide on using mobile phone surveys to track resilience and disaster recovery'

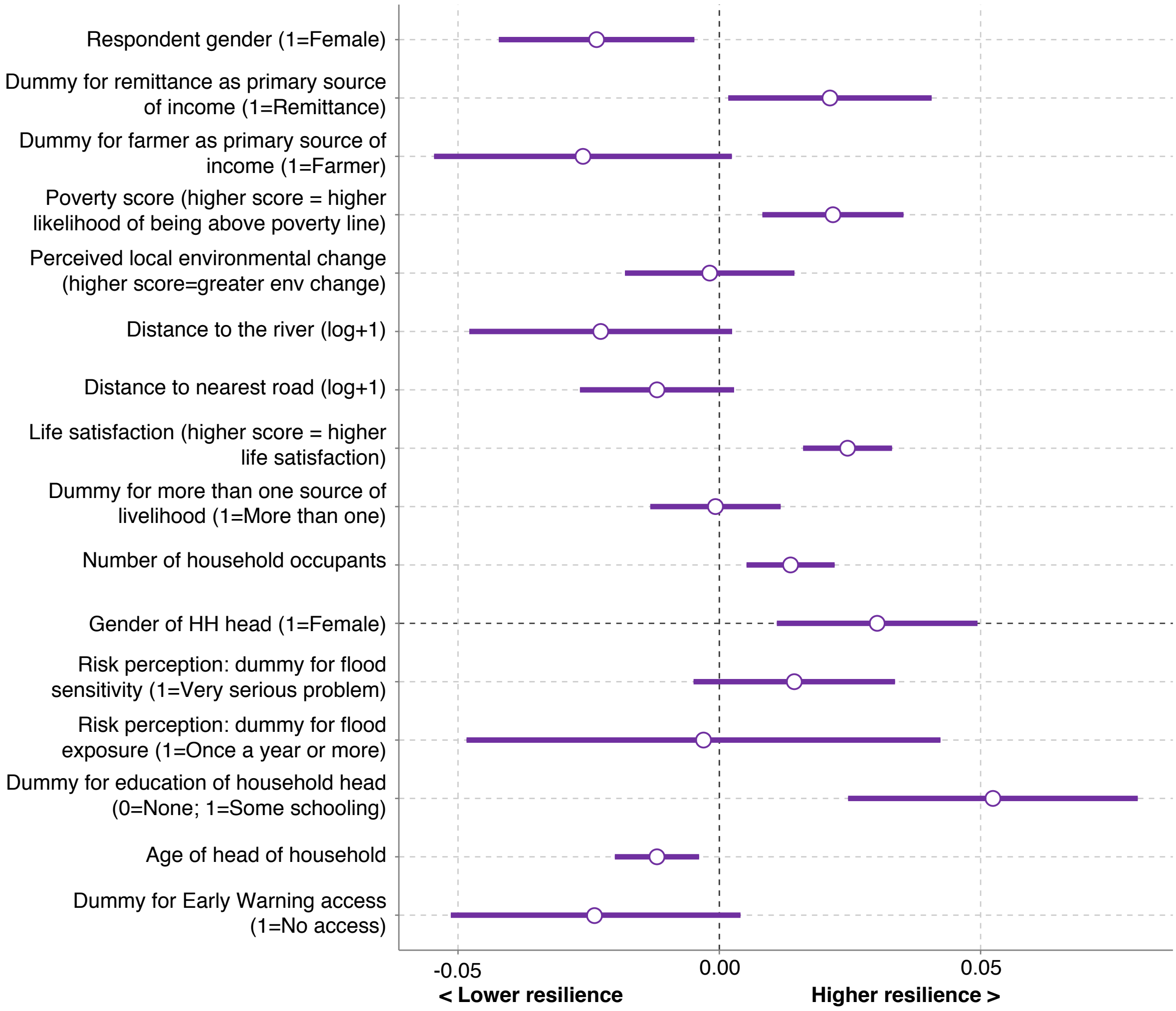
For interactive visualisations and access to summarised data refer to the Resilience Dashboard.

Key Insight #1: Measures of perceived resilience can yield invaluable insights.

The resilience measurement literature is full of suggestions for factors associated with household resilience. Quality and quantity of household assets, levels of education, diversity of livelihoods, social networks and family ties are each thought to play a strong role. But these associations are made mostly on the basis of objective assessments: outside observers making assumptions and observations about the resilience of others. Do the same factors show up when we ask people to rate their own resilience?

Fortunately, when we look at subjective results from the RRRs we see a range of similarities with traditional assumptions. Figure 1 shows results from a statistical model that infers associations between household resilience (measured using SERS) and various socio-economic factors. Dots to the right of the dashed grey line are considered to be positively associated with resilience, whereas those to the left are negatively associated – for more details see Jones (2018a).

Figure 1: Factors associated with subjectively evaluated resilience in Hpa An, Myanmar



Source: Based on RRR survey data
Note: Plot shows regression coefficients for a range of variables with baseline subjectively evaluated resilience scores as the dependent variable. Coefficients are represented as dots, with 95% confidence intervals shown in bands. Variables are statistically significant if the bands do not touch the grey dotted line (at 0). Standard errors are clustered at the village level, and generated using a Wild Clustered bootstrap technique. All numeric variables are standardised.

To begin with, see can see that households with higher levels of education and lower likelihood of poverty tend to perceive themselves as more resilient (both dots are to the right of the central vertical grey line). This makes clear sense given the importance of assets and human capital in driving a household's resilience. Those that rely heavily on remittances also associated with higher resilience – much of this is likely because of money being sent back from members of the family working temporarily in Thailand and the Middle East. Farmers are seen to have lower levels of resilience than other livelihoods, though the trend is not statistically significant (at 95% threshold).

We also observe some interesting differences. For one, female-headed households are associated with higher resilience than those headed by men. We often assume the opposite to be true (Alhassan et al. 2019). Part of this may be because of differences in how men and women rate their own resilience. However, we should also note that women generally report lower scores than men overall[1] (suggesting that the association with female-headed households may be even greater). Perhaps in the context of our study area, female-headed

1 Household surveys were conducted with a 50/50 split between males and females.

households are not a particularly vulnerable group after all.

Another curious finding is that households with a higher number of occupants report higher resilience scores. Though this is not something we normally associate with resilience, it may point to the importance of human capital and larger family or social networks. Similarly, those with older household heads fare worse compared with younger households, likely related to livelihood and job opportunities.

Each of these findings provides an interesting validity check of what we assume to be the drivers of resilience. Resilience from the perspective of those experiencing shocks and stresses directly should hold some validity, and offers an alternative way of comparing resilience across different social groups.

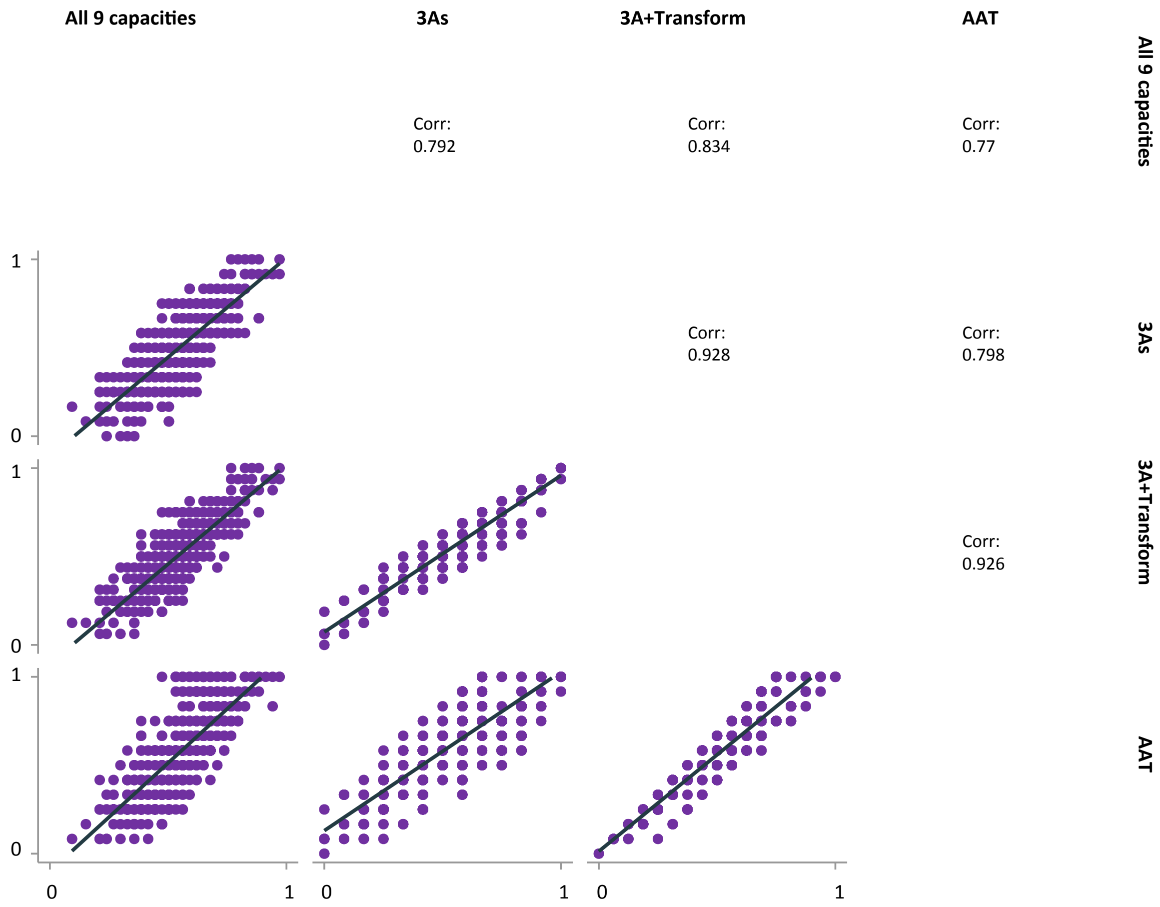
For more detailed insights into each of these findings see Jones (2018).

Key Insight #2: No matter which characteristics you associate with (self-assessed) resilience, outcomes are largely the same.

Resilience practitioners and academics spend a great deal of time arguing over what resilience is. BRACED, for example, considers resilience to be made up of three capacities: anticipatory, absorptive and adaptive (the '3As' model). Others argue that resilience should also include the capacity to transform entirely. Many additional capacities and capitals have been suggested, including social and financial capitals, as well as the capacity to learn from previous shock events (Tschakert and Dietrich, 2010).

From the point of view of most resilience evaluators, choosing the right mix of resilience capacities is key to determining whether a household is seen as resilient or not. Yet insights from the RRR suggest otherwise. As part of the project, we asked questions about nine different resilience-related capacities. These allowed us to define resilience in lots of ways. While we fully expected this chopping and changing to make big differences to the eventual resilience scores, Figure 2 shows how, no matter how resilience is broken down, outcomes tend to be the same. This is the case no matter whether we use an average of all nine capacities; apply BRACED's 3As; adds transformation to the 3As model; or compute a score with absorptive, adaptive and transformative capacities only (the most common resilience framework used in the resilience literature, which we call AAT).

Figure 2: Correlation matrix of difference characterisations of resilience



Source: Based on RRR survey data
Note: Axes for all graphs show SERS using different variants (with 0 classified as 'not at all resilient' and 1 meaning 'fully resilient'). Panels in the lower left corner plot relationships between variants of the SERS module; values in the upper right show correlation coefficients.

The implications of this are particularly interesting. If shown to be robust, it suggests that perhaps too much time is spent on nit-picky decisions on which capacities are most important to household resilience. If the 3As model of resilience is able to adequately predict resilience as made up of nine different capacities, then it also suggests that use of a number of SERS subsets will give you similar results. Doing so may prove invaluable in reducing the length and cost of resilience surveys.

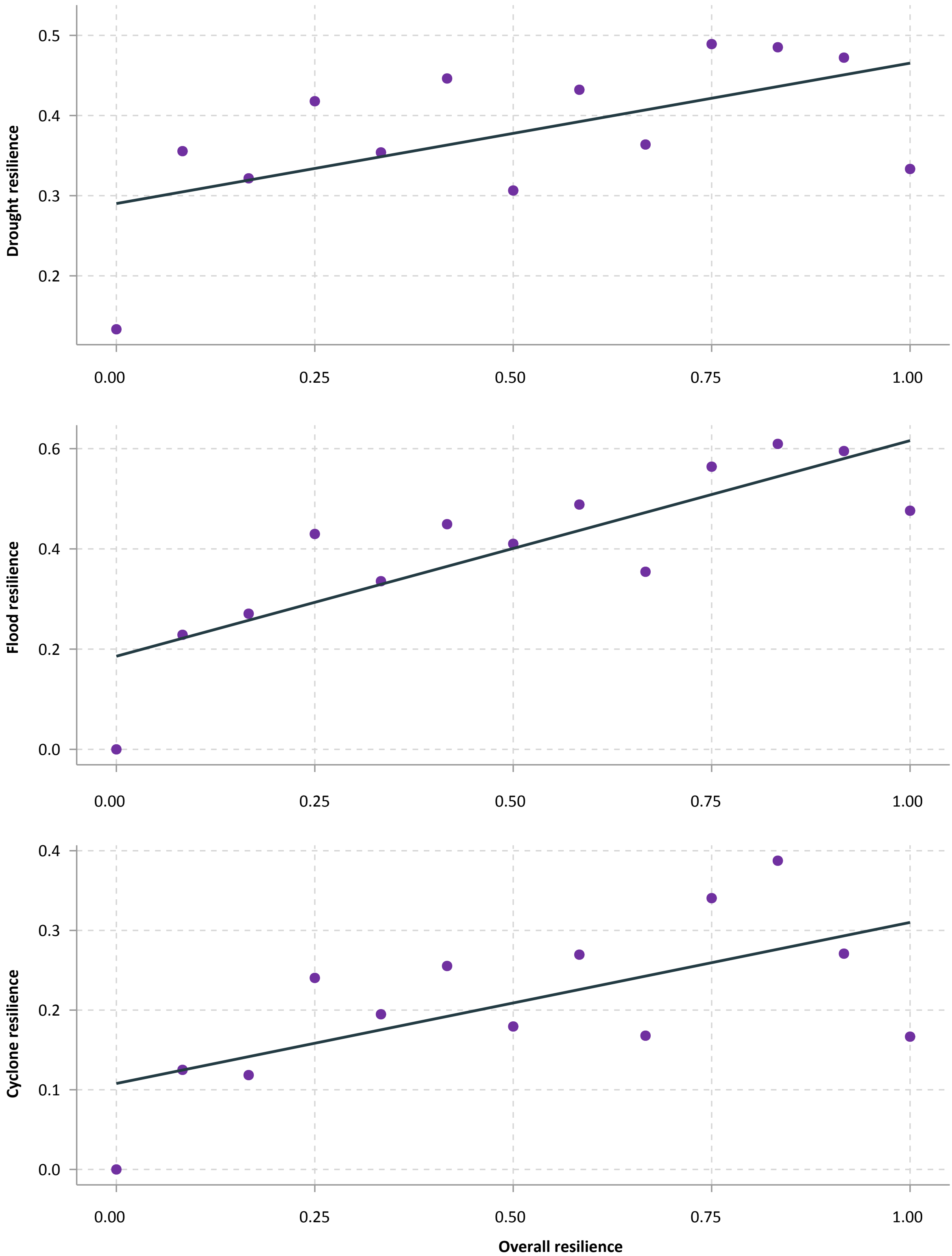
For more detailed insights into each of these findings see Jones (2018).

Key Insight #3: Think carefully in choosing between hazard-specific and overall resilience.

At the start of any resilience evaluation, an important decision has to be made: resilience to what? The most common approach is to measure a household's resilience to a specific hazard. If the evaluation takes place among pastoralists in northern Kenya, then drought resilience may be the most logical option; if it takes place among fishers on the banks of the Mekong River, then flood resilience will be more appropriate. But resilience is complicated: a household's ability to deal with one hazard will also depend on interactions with other shocks and stresses.

With this in mind, the RRR sets out to examine nuances between overall and hazard-specific resilience. Reassuringly, when we look at survey responses, we find that both types of resilience are closely linked: households that perceive themselves to be highly resilient to a specific threat tend to be resilient to a range of threats (see Figure 3). The trend is true no matter if we look at floods, cyclones or droughts. This close match is important. It suggests that the capacities needed in responding to one hazard (say flooding) are closely related to those in dealing with another (say cyclones). They also suggest that evaluators may be able to use one module for overall resilience, rather than having to use separate modules for every potential hazard a household could face. Again, doing so would help save valuable time and prevent survey fatigue in people's responses.

Figure 3: Relationship between overall and hazard-specific resilience



Source: Based on RRR survey data
Note: Plots show mean hazard-specific resilience scores for different values of overall resilience using the SERS approach. Resilience scores for both axes range from 0 (meaning 'not at all resilient') to 1 ('fully resilient').

We should, however, point out that overall and hazard-specific resilience are not perfectly matched. If we look at the raw scores, there is plenty of variation between the two – even if neat linear patterns exist when looking at average scores. Evaluators should not necessarily equate one with the other. Rather, they should be treated as loose approximations. Decisions on which of the different modules to use need to be taken based on the basis of evaluator preferences, context and resources. If an evaluator is interested only in understanding flood resilience, then a hazard-specific module will be most relevant; for those interested in a range of overlapping threats, or where there is not enough time or space to include a full set of hazard-specific modules, then tracking overall resilience may be a better choice.

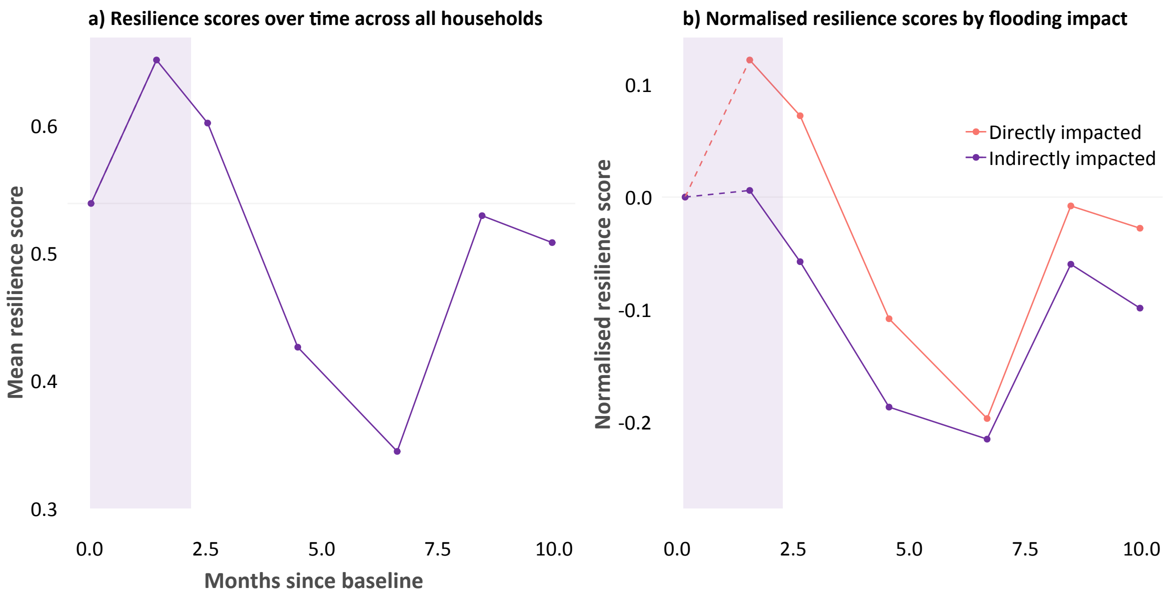
For more detailed insights into each of these findings see Jones (2018).

Key Insight #4: The impacts of disasters can be tracked over time using mobile phones and subjective tools.

One of the key findings from the RRR is that people's resilience changes over time. Resilience scores are also closely affected by what's going on around them. In fact, changes in resilience can sometimes happen quickly – especially if a large hazard occurs nearby. In the context of Hpa An, villages were affected by a flood that took place shortly after the first baseline survey. Using the mobile phone set-up, we were able to track how the flood affected resilience in near real time, tracking recovery rates over time.

Figure 4 shows just how quickly resilience scores can fluctuate. Panel a) on the left tracks resilience scores for the first 10 months of the RRR survey. Importantly, widespread flooding in Hpa An took place in between the first and second rounds of the survey (the first two dots). Bizarrely, resilience scores seem to jump up during that time period. While this may suggest the floods had a strong positive influence on resilience, it actually reflects differences between how the surveys were carried out between the first and the second rounds – the former done face-to-face and the latter via the phones (we return to this later on in Insight #7). The more important trend is what happens afterwards. Here we see a steep decline in resilience scores across all households in the RRR. In fact, the drop continues till the seven-month mark, before starting to rebound somewhat. This gives us invaluable insights into how the flood may be affecting livelihoods in the area, and may provide a valuable opportunity for others looking to track resilience on the ground.

Figure 4: Changes in resilience scores after flooding in Hpa An



Source: Based on RRR survey data
Note: The plot shows average SERS for households over time. The red shaded area represents the period that large floods affected the area. Resilience scores range from 0 (meaning 'not at all resilient') to 1 ('fully resilient').

To take a closer look at the impacts of the floods we can also separate household by those directly and indirectly impacted.[2] As we might expect, we see quite large differences in how resilience changes over time between the two groups. Directly affected households face an immediate large gap in scores, with the difference appearing to slowly whittle down over time. The same process can also be used to compare social groups, such as male-/female-headed households or wealthy/poorer households. Again, this shows how invaluable subjective scores can be in shedding insight on local resilience.

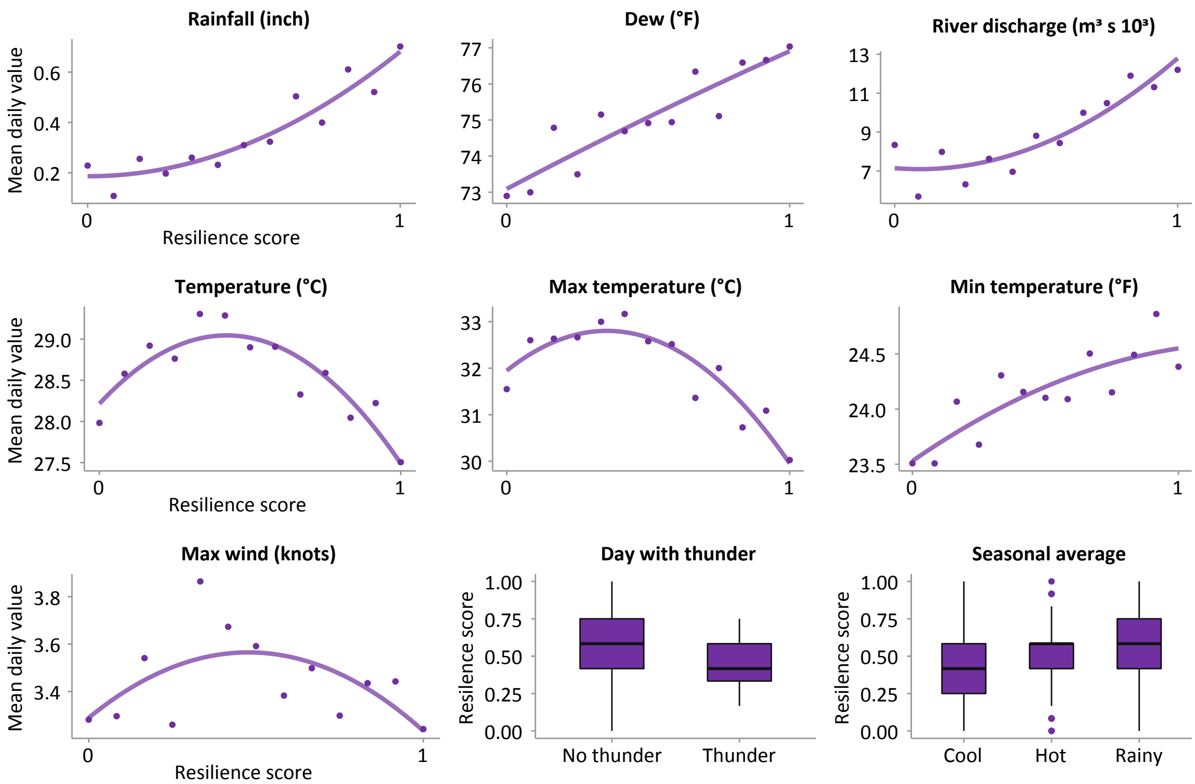
For a more detailed look at how flooding affected resilience scores in Hpa An see Jones and Ballon (2019).

Key Insight #5: People's resilience changes with weather and seasons.

One of the most interesting findings from the RRR is that it is not only large shocks (like the floods described above) that affect resilience. Slower, more gradual, changes also appear to have significant effects. When we matched resilience scores with daily climate information from a nearby weather station, close relationships between resilience and seasonal shifts in weather became evident.

Figure 5 shows that subjectively evaluated resilience scores are closely matched with the weather on the day of interview. It also shows how scores differ from one season to the next. Perceived resilience is lowest during the cold season, and much higher during the hot and rainy seasons. The neat and precise relationship with many of the weather variables is especially striking – as is the fact that quite a few of the trends are non-linear. If we look at temperature, for example, we see that lower scores are reported during colder and hotter periods of the year. The same is also true for maximum speeds. For river discharge, we see that the positive influence of river discharge magnifies as river levels rise.

Figure 5: Relationship between resilience and daily weather values



Source: Based on RRR survey data
Note: Plots show mean daily weather values for the full range of SERS scores in Hpa An. Resilience scores range from 0 (meaning 'not at all resilient') to 1 ('fully resilient').

2 Households that report that the flood had a significant impact on their way of life in the first two months are classed as directly impacted.

These relationships are fascinating, and (admittedly) somewhat unexpected. What do they point to? We can see two important traits worth considering. The first is the possibility that people's resilience may gradually fluctuate across seasons – with seasonal changes in weather playing a large role. This makes sense: it is highly likely that a household's ability to deal with risk is different during the cold season (when farmers have no crop to cultivate), compared with the rainy and hot seasons (when crops can be sown and harvested). The graphs in Figure 5 may well show how people subconsciously factor these issues in when self-assessing themselves.

If this is true, then this has considerable implications for resilience policy and practice. Most development agencies assume resilience is relatively constant over time (at least from month to month). Much of this impression comes from the fact that resilience is traditionally measured using objective indicators – many of which change very slowly (such as household assets, or livelihood activities). Yet subjective judgements such as those gathered by the RRR may be picking up on more rapid inter-annual fluctuations, forcing us to rethink how we conceptualise and support resilience on the ground.

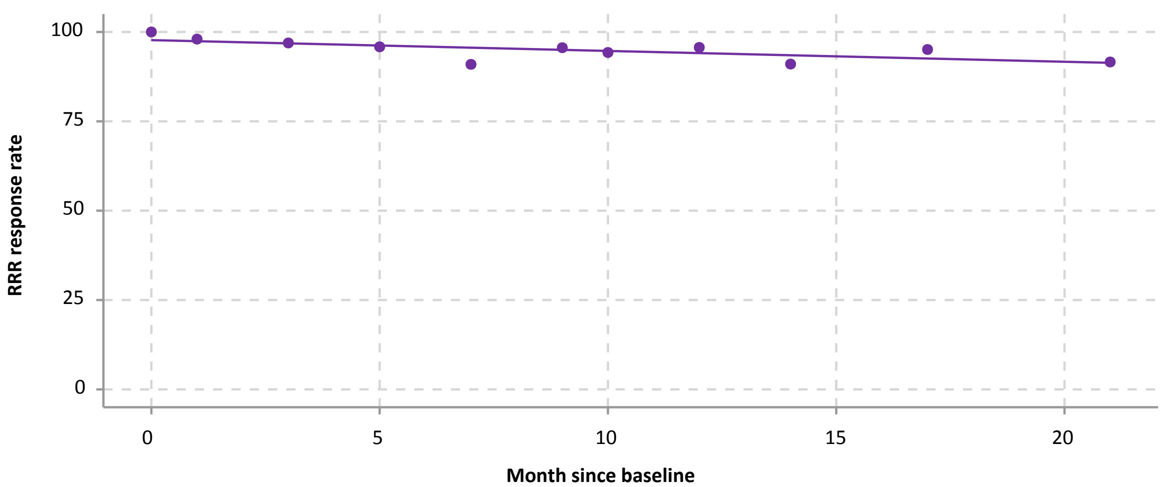
Another possibility is that people's mood and judgements of themselves may change across seasons. It may well be that people have more rosy outlooks on life during different periods of the year, which would in turn bias subjective scores. While it is difficult to rule these out entirely, we suspect the former reason may be a stronger driver, given the neat and step-wise nature of the weather-resilience relationships. We plan to look at these relationships in more detail as part of future related research.

Key Insight #6: A few simple tips and tricks can keep mobile phone surveys going strong.

One of the main fears in running a panel survey is that people will drop out and lose interest over time. In face-to-face surveys, it is not uncommon to see dropout rates of 15–20% in annual surveys, up to 50% if no active tracking of individuals is done. Evaluators therefore have to spend considerable amounts of time and money chasing individuals and keeping them engaged in the panel survey. This is where the big advantages of mobile phone surveys come in. First, people can be easily contacted at a time of their inconvenience, meaning they are much more likely to want to respond. Second, even if people are out of their house (say farmers working in their fields), or temporarily relocated, they will often keep the phones on them. This makes it easier for call centre enumerators to get in touch and carry out the surveys (or at least arrange for a suitable time to call them back).

So how did the RRR fare when it comes to attrition? Reassuringly, response rates across the 11 rounds were exceptionally high, averaging 95%. As Figure 6 shows, there was a gradual decline in responses, with the rate down to 92% in the final round 21 months after the baselines. However, when you consider the sheer number of times people were interviewed during the RRR, the high rate of response is extremely encouraging.

Figure 6: Response rates across 11 rounds of the RRR mobile phone panel survey



Source: Based on RRR survey data

We believe several factors are responsible for the high response rates. For a start, households were each provided with a mobile phone and solar charger at the start of the RRR. This made it much more likely that those without a phone or access to electricity prior to the start of the survey could take part. It also acted as a gesture of goodwill. Households were free to use the phone as they pleased, with no restrictions. Indeed, in cases where people already had a phone that they used regularly, we allowed them to switch interview calls to their preferred number.

Surveys were also short, lasting 10–12 minutes on average, meaning that time spent on the phone was kept to a minimum. To account for the fact that people have busy working days, we asked people what time of day they would prefer to be contacted. We also collected phone numbers from all family members and nearest neighbours so that we could easily trace respondents when they were out of the house (or if the phone's battery had died). Lastly, we provided them with a small financial gift at the end of every completed call. The sum came to $0.50 and was meant as a way of showing our appreciation for continuing with the RRR project.

Many of these tips and tricks are easy to replicate in other contexts, and we hope they are of use to others looking to run future mobile phone survey.

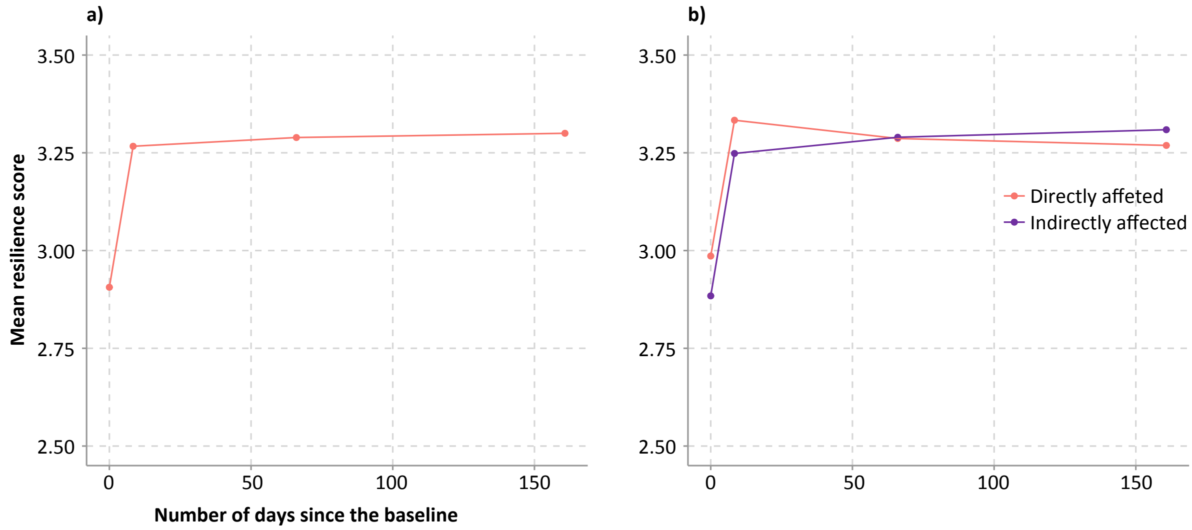
For more detailed insights into each of these findings see von Engelhardt (2019).

Key Insight #7: Resilience scores differ when conducted face-to-face compared with over the phone.

It is well known that how you ask survey questions, and the environment within which the survey is conducted, can have important implications for responses. This process is often known as 'priming', and is particularly important for subjective or perception-based questions. In the case of the RRR, we used two very different modes of administration between the baseline face-to-face survey and the mobile phone surveys that followed. This provided a unique opportunity to test differences between the two approaches.

Given that the period between the baseline and the first mobile survey was very short in our Mudon site (roughly one week), we were able to directly compare resilience scores. What we found was that a large jump in resilience scores happens when moving from face-to-face to phone surveys. This jump is clearly visible in Figure 7, which shows resilience scores across different rounds of the RRR. One possibility is that the floods that happened just before the baseline survey could be responsible for the large gap in scores (unlike in Hpa An, the Mudon survey started immediately after flooding). However, when we look at differences between directly and indirectly affected households (Figure 7b), we see that the same pattern is visible for both groups. This gives us confidence that the jump in scores is indeed coming from changes in how the survey is being administered rather than any outside factors.

Figure 7: Differences between face-to-face and mobile phone resilience scores



Source: Based on RRR survey data
Note: Resilience scores range from 0 (meaning 'not at all resilient') to 1 ('fully resilient').

One thing we can also do is check if these differences in scores are uniform across groups. If evaluators are interested in comparing resilience between different groups, then the jump in scores should not matter much as long as it happens to everyone in the same way. This is something that we can test for easily. Reassuringly, when we do so, we that differences are indeed relatively uniform. Almost all socio-economic groups are affected by the jump in scores to the same extent. The one exception appears to be for female-headed households, which tend to have slightly larger differences – an issue that is worth considering in any future comparisons of face-to-face and phone modes of administration.

For more detailed insights into each of these findings Von Engelhardt, 2019.

Key Insight #8: Mobile phone surveys offer cheap and near-real-time ways of collecting survey information.

Perhaps the most important insight from the RRR is that mobile phone surveys offer a wealth of potential in providing cheap and timely information on resilience. Traditional household surveys are expensive and logistically difficult to coordinate. These challenges are even more acute in post-disaster or conflict-affected areas, where roads or other transport networks may be damaged, or where it is unsafe for survey teams to access the area.

In many ways, the RRR is a valuable proof of concept. The average cost of a completed phone survey was $5.50, inclusive of all set-up, maintenance and administrative costs (as well as the small financial incentive). Face-to-face surveys, on the other hand, can cost $15+ per survey. Costs can easily spiral once you consider the logistical implications of tracking the same individuals once they have moved (or if they are proving difficult to locate).

Our experience was all the more rewarding as our national survey provider, Third Eye Co., was so encouraged by the prospect of running mobile surveys that it included them as a new service in its business portfolio. In so doing, equipment and set-up costs were borne by the company itself as it sought to expand its market share in Myanmar. While this experience may be unique, it goes to show the potential and growing interest for mobile surveying in developing countries.

Mobile surveys do have limitations, however. It is not possible to run a survey for more than 20 minutes without risking respondents losing interest – either hanging up or worse: providing false answers. This is why the combination of the SERS module and phone surveys works so well. Resilience scores can be generated in just a handful of minutes. The same procedure would not work if looking to deliver a traditional objective approach like the popular Resilience Index Measurement Analysis (RIMA), used by the Food and Agricultural Organization and others.

Perhaps the hardest part of running a mobile phone panel is getting a representative sample. Replicating the RRR's approach running a face-to-face survey before transitioning to a mobile survey is one option. But doing so is much more challenging immediately after a disaster. In cases where a group of phone numbers are already known (perhaps from a previous survey, or through information-gathering of beneficiaries of a non-governmental organisation project), it is possible to bypass the need for a face-to-face survey. Other options include random digit dialling – though this procedure relies on sophisticated weights and statistical analysis.

For more detailed insights into each of these findings Von Engelhardt, 2019.

Irrespective of these challenges, we believe that lessons learnt and experiences from the RRR can help future resilience evaluations. Most of our key insights will apply to phone or subjective surveys anywhere in the world, and offer ways of addressing key gaps when running traditional objective measures of resilience. Above all, we hope the RRR can inspire new innovations in resilience measurement. Greater diversity in knowledge sources will give us a better understanding of how resilience manifests at the local level. Doing so is crucial in improving the design, targeting and evaluation of resilience-building interventions by development and humanitarian actors.

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Front cover photo: thaths/Flickr
Basket salesmen play with a mobile phone as they squat on the tracks and wait for the Yangon Circle Line train

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.

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