

1 Subjective measures of climate resilience: what is the added value for policy and 2 programming?

3 4 **Abstract**

5 Subjective approaches to resilience measurement are gaining traction as a complementary approach
6 to the standard frameworks that typically contain objective measures. Proponents suggest that
7 subjective approaches may add value to existing measures in three areas: by improving our
8 understanding of the drivers of resilience, reducing the questionnaire burden on respondents, and
9 potentially offering more valid cross-cultural comparisons. This perspective assesses the potential,
10 evidence and uncertainties around each of these claims, drawing from decades of research using
11 subjective techniques in the wellbeing and psychological resilience literatures. Overall we find that
12 subjective approaches can theoretically add value in each of these three areas. However the design
13 of appropriate indicators must proceed with specificity and rigour for subjective measures to add
14 value to programming and policy for climate resilience.
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16 **1 Introduction to subjective measures**

17 Subjective measures are those that gauge the perceptions, opinions, preferences or self-
18 assessments of individuals (Maxwell et al. 2015) and there is growing interest in their application to
19 measuring climate resilience (Maxwell et al. 2015; Béné, Frankenberger, et al. 2016; Carletto et al.
20 2015; Jones & Tanner 2016; Conostas, Frankenberger & Hoddinott 2014). This primarily stems from
21 the premise that people have a strong understanding of their own resilience, and that this may be
22 **distinct from** the landscape of resilience that emerges using standard resilience measurement tools,
23 which tend to deconstruct resilience into its component capacities, measure each capacity
24 individually, and then re-construct an index from these measures (FAO 2015; FAO 2014; Smith &
25 Frankenberger 2015; DFID 2014).
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27 Across the literature on subjective resilience measures to date (Béné, Frankenberger, et al. 2016;
28 Béné, Al-Hassan, et al. 2016; Jones & Tanner 2016; Nguyen & James 2013), there are three key
29 proposed benefits. In comparison with existing resilience measurement frameworks, it is hoped that
30 subjective resilience measures can:

- 31 ▪ Improve our understanding of the drivers of resilience
 - 32 ▪ Reduce the questionnaire burden on respondents
 - 33 ▪ Provide more cross-culturally valid comparisons of resilience
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35 Given the attraction of these claims, and the speed with which subjective measures of climate
36 resilience are generating interest, it is important to distil our knowledge on the merits, limitations
37 and potential for added value of this approach. We first present a brief overview of the salient
38 characteristics of resilience, after which the following three sub-sections examine the evidence base
39 for each proposed benefit and assess the potential of subjective resilience measures to add value to
40 existing objective measures of resilience.
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42 **2 A brief history of resilience**

43 The concept of resilience has historic roots in a number of disciplines including engineering, ecology
44 and psychology (Alexander 2013). The term has recently gained traction within the climate and
45 development communities as a guiding framework for the design of climate-resilient development
46 policies and programmes (Tanner et al. 2015; Brown 2016; Béné et al. 2012; Barrett & Conostas
47 2014).
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49 Although many definitions exist for climate resilience in this context (hereafter referred to simply as
50 'resilience'), it can be broadly considered as 'the capacity of all people across generations to sustain
51 and improve their livelihood opportunities and wellbeing despite environmental, economic, social

52 and political disturbances' (Tanner et al. 2015, pg. 23). Importantly, this definition highlights the
53 difference between resilience and wellbeing. Where wellbeing is taken as the ultimate goal for
54 human flourishing, resilience is seen as a set of capacities that are evaluated in the present time and
55 that mediate the impacts of shock and stressor events on current and future wellbeing (Barrett &
56 Conostas 2014; Conostas, Frankenberger & Hoddinott 2014). As a result, resilience requires a separate
57 set of measurement tools to those that already exist for wellbeing (OECD 2013; Boarini et al. 2014;
58 Diener et al. 1985).

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60 As resilience is not directly observable, it must be inferred from the measurement of items that can
61 be observed, whether they are objective indicators about, for example, the presence of flood
62 defences, or the subjective opinions of respondents about the adequacy of such defences in
63 protecting them against shocks and stressors. As such, resilience is a latent variable and, with a
64 broad range of definitions in existence, quantitative measurement of resilience therefore poses a
65 significant challenge. Numerous methodologies and frameworks have been designed to date, each
66 subtly different but often sharing a core set of methodological steps. Firstly the concept of resilience
67 is usually broken down into multiple capacities that are deemed relevant, often through a
68 combination of local consultative exercises, external elicitation and expert judgement. The capacities
69 are then assigned proxy indicators as measures, data on which are collected via surveys or accessed
70 through secondary databases. Often these indicators are objective, i.e., they are observable
71 characteristics of the external environments in which people live, covering items such as income,
72 social networks, infrastructure and resource access (FAO 2016; FAO 2015; Barrett 2015). Finally the
73 data on these indicators are combined either through simple averages, weighting or more complex
74 statistical procedures such as factor analysis, to derive a single-value measure of overall resilience.

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76 There are many well-documented drawbacks to this approach (Levine 2014; Jones & Tanner 2015;
77 Béné, Al-Hassan, et al. 2016). Firstly, when selecting the resilience capacities to measure, experts are
78 unlikely to know *a priori* which aspects of a given environment make the people within it resilient to
79 climate-related shocks and stressors. Secondly, even if all the relevant resilience capacities are
80 known for a given situation, they are often difficult to measure objectively and/or meaningfully.
81 Finally, even if all relevant resilience capacities are known *and* validly measurable, a composite
82 resilience indicator necessitates their combination into a single value. This process is fraught with
83 complexity in terms of standardising the indicators, weighting their relative influence, and
84 accounting for interactions between them.

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86 **3 Applying subjective approaches to climate resilience**

87 Another approach that may provide complementary information is the use of subjective resilience
88 measures. There is some overlap between what constitutes an objective and a subjective measure,
89 and in many ways subjectivity and objectivity can be conceptualised along a spectrum rather than as
90 distinct binary classifications. However there are two key features of subjective measures that tend
91 to distinguish them from objective measures. The first is that subjective measures seek to evaluate a
92 personal perception, evaluation or opinion of a topic. The answer format could be qualitative (for
93 example, free form speech) or structured (for example, using a Likert scale to rate agreement). This
94 contrasts with objective measures, which rely heavily on the use of indicators that are externally
95 verifiable. Importantly, subjectivity is not necessarily the same as asking for a self-report. For
96 example, "How many children do you have?" is a self-report question, but wouldn't typically be
97 considered as subjective in nature. It asks for an objectively verifiable quantity, rather than an
98 opinion or perception, even though there may be some degree of subjectivity in the answer
99 provided. The second distinguishing feature of subjective questions is the topic itself. Some topics
100 are inherently subjective, for example happiness, whereas others may be measured objectively and
101 subjectively, for example measuring stress severity through number of sick days taken or through
102 subjective ratings of stress levels (Rammstedt 2009). As such, some questions may be classed as

103 subjective due to the topic alone, or due to a combination of the topic and the request for an
104 opinion/perception.

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106 In the case of climate resilience, subjective measures are being used in two ways. The first is as a
107 measure of the overall resilience ‘level’ of a household or individual. This means that, instead of
108 deconstructing resilience into a number of proxy indicators, measuring them, and then constructing
109 a single index, subjective resilience measures are used to assess people’s perceptions of their overall
110 perceived resilience to shock/stressor types, typically within a specified timeframe. For example,
111 Nguyen & James (2013) ask respondents the extent to which they agree with statements such as “I
112 am confident that my household has enough rice to eat during the flood season” and “I am
113 confident that the health of my family members will not be negatively affected during the floods”.

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115 The second application of subjective measures is to investigate the psycho-social characteristics of
116 individuals as resilience capacities, and their relationship to overall resilience, as illustrated in Figure
117 1, from Béné, Frankenberger, et al. (2016). There is increasing evidence that psycho-social
118 characteristics such as self-efficacy, perceived adaptive capacity, sense of place and risk perception
119 affect resilience and adaptive capacity (Béné, Al-Hassan, et al. 2016; Burnham & Ma 2016; Kuruppu
120 & Liverman 2011; Marshall 2010; Grothmann & Patt 2005; Jones & Boyd 2011; Lockwood et al. 2015;
121 Adger et al. 2013) and therefore the use of subjective measures in this context is to explore how
122 these subjective elements may contribute to variations in overall resilience of individuals and/or
123 households. Thus, rather than measuring an overall resilience level, this application of subjective
124 measures investigates the component drivers of resilience.

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126 Importantly, the use of subjective measures to explore the *drivers* of resilience is distinct from the
127 use of subjective measures to understand overall *levels* of resilience. In this perspective we focus on
128 subjective measures of resilience *levels* for two reasons. Firstly because subjective measures of
129 resilience levels are a very new concept and must be developed from scratch, whereas
130 psychometrically-validated scales for subjective concepts such as self-efficacy, fatalism, hope, and
131 strength of faith have been developed in other disciplines for many decades (Sherer et al. 1982;
132 Shen et al. 2017; Herth 1992; Plante & Boccaccini 1997). Moreover, subjective measures of
133 resilience levels have been the main focus of the subjective climate resilience measurement field to
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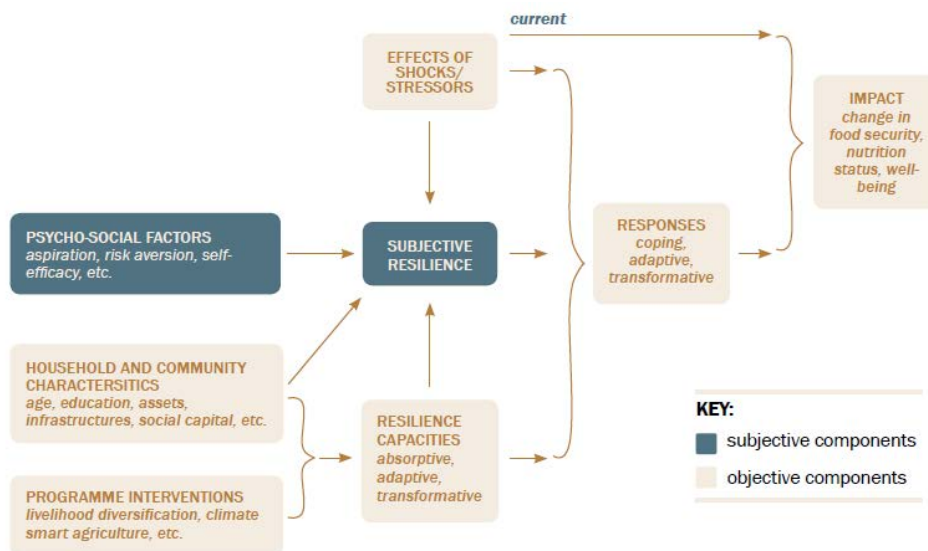
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136 With this in mind, we now assess the evidence base for each of the three proposed benefits that
137 subjective measures of resilience levels may offer, compared to existing objective measures.

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139 *Figure 1 – Conceptual framework of objective and subjective components of resilience (Source; Béné*
140 *et al. 2016)*

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3.1 Improving our understanding of the drivers of resilience

As resilience is a latent concept whose measures cannot be objectively verified, the preferred way to assess the value of a resilience measure is its ability to predict an outcome of interest, usually relating to food security, nutrition status or other measures of wellbeing (Constas, Frankenberger & Hoddinott 2014). Therefore, if subjective resilience measures are proven to be valid measures of overall resilience levels, they could be used as the mediating variable of interest between measures of resilience drivers and ultimate wellbeing outcomes.

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At present no data are available on the predictive power of subjective resilience level measures, however there is evidence from the fields of wellbeing and psychological resilience that subjective approaches can yield valid and reliable data that are predictive of and/or associated with positive life outcomes. For example, in the psychological resilience field, a number of psychometrically robust subjective scales are in use, often reflecting different target populations, risk factors or definitions of resilience. Examples include the Resilience Scale for Adults (Friborg et al. 2003), a brief and extended Children and Youth Resilience Measure (Liebenberg et al. 2013) and the Resilience Scale (Wagnild 2009). Evidence shows that scores on these subjective scales are predictive of objective wellbeing measures. For example, in diabetic adults psychological resilience scales are predictive of glycaemic control and self-care behaviours (Yi et al. 2008) whilst in children exposed to prolonged violent conflict they are predictive of prosocial behaviours, alongside the absence of psychiatric symptoms such as posttraumatic stress, depression and anxiety (Jordans et al. 2010).

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In the context of climate and development, the predictive value of subjective resilience level questions will depend strongly on their design, which is in very early stages of development. However much can be learned from past work to develop scales that measure subjective wellbeing (Diener et al. 1985) and psychological resilience (Ungar et al. 2008). Comparing these literatures with that of subjective climate resilience measures, two key differences in approach are apparent.

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Firstly, many existing subjective climate resilience measures tend to be shock-specific, relating to events such as floods, droughts or storms, whereas psychological resilience and subjective wellbeing measures include appraisals of resilience/wellbeing that span across life domains. Experience from the psychological resilience literature suggests that some indicators of resilience can be relevant across multiple risks, leading to the development of (1) a *cross-risk* approach, which seeks

178 conceptual and applied knowledge across and between risk factors, varying from exposure to war to
179 living with chronic illness and (2) a *risk-specific* approach that identifies processes exclusively or
180 mainly relevant to specific risk factors. This has identified mechanisms that tend to promote
181 resilience regardless of the risk factor under question, such as the presence of a **strong and positive**
182 relationship with an adult, perceived social support, and effective coping skills (Graber et al. 2015).
183 In contrast, other mechanisms are more domain-specific, such as the availability of stable housing
184 and information sharing among children with parents living with HIV/AIDS (Betancourt et al. 2013;
185 Rodriguez-Ilanes et al. 2013). Overall this suggests that it is worth exploring both cross-risk and risk-
186 specific approaches to subjective resilience measures in the climate and development context, in
187 order to thoroughly test their predictive value of wellbeing in comparison to objective measures.

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189 The second difference is that existing subjective resilience measures typically ask people to predict
190 their resilience at a future time or in comparison to a past event. By contrast, measures of
191 psychological resilience and subjective wellbeing ask about present perceptions. Prospective
192 memory and retrospective memory tasks require recruitment of distinct memory processes, which
193 complicates their use within a single questionnaire item (Crawford et al. 2003). In psychometric
194 assessment, it is accepted practice to include a specific time frame within the response (such as
195 “within the next 6 months” or “within the last month”) to minimise issues with recall and variations
196 in interpretation. This has been noted in discussions of subjective resilience question design (Jones &
197 Tanner 2016), however the effects of such recall issues on measure validity have yet to be
198 thoroughly appraised.

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200 Overall, there is a significant amount of work to do before we can say with confidence that
201 subjective climate resilience measures, in a specified format, are a) good predictors of future
202 wellbeing and b) better predictors of wellbeing in the face of shocks and stressors than objective
203 measures. However evidence from the psychological resilience and subjective wellbeing fields
204 suggests that there is potential for subjective approaches to measure latent concepts that can
205 predict wellbeing.

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207 **3.2 Reducing the questionnaire burden on respondents**

208 If subjective resilience level measures are found to be valid predictors of wellbeing in the face of
209 shocks and stressors, they might theoretically reduce the resilience questionnaire burden on
210 respondents. This is especially relevant where the main goal of a questionnaire is to investigate the
211 level, rather than the drivers, of resilience. This may be the case where a detailed baseline survey
212 has been completed to determine resilience drivers and levels, **and subsequent monitoring of**
213 **resilience levels** is required going forwards.

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215 Existing resilience measurement frameworks are notably data-intensive, largely arising from two
216 characteristics of resilience operationalisation. First is the drive to measure all relevant components
217 of resilience at all appropriate levels. Resilience is a multi-faceted construct, and can be
218 characterised at individual, household, community, regional and/or national levels, quickly leading
219 to large numbers of measures being used in models and surveys (Smith & Frankenberger 2015).

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221 Second, resilience is often measured in relation to the experience of shock/stressor events (Barrett
222 & Headey 2014), and is seen as a dynamic process, which implies constant monitoring to remain
223 informed of changes. This inevitably places a significant time burden on respondents.

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225 Whether subjective measures of resilience levels can reduce this questionnaire burden depends on
226 the aim of measurement. If subjective measures are consistent, valid and at least equally good
227 predictors of wellbeing compared to objective measures, they could be used to monitor resilience
228 levels with a lower questionnaire burden, as they do not deconstruct overall resilience in to its

229 component capacities. However if the measurement aim is to elucidate the drivers of resilience,
230 objective resilience measures will still be needed to explore the relationships between socio-
231 environmental characteristics and resilience. Thus, subjective resilience measures may reduce the
232 questionnaire burden where the focus is resilience levels only, but not where the question is on
233 understanding the functional drivers of resilience levels (Béné, Al-Hassan, et al. 2016).

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235 **3.3 Providing valid cross-cultural comparisons of resilience**

236 Significant emphasis has been placed on finding culturally transferable measures of resilience that
237 provide valid comparisons across contexts (Jones & Tanner 2016; Barrett & Conostas 2014; Conostas,
238 Frankenberger, Hoddinott, et al. 2014). Objective approaches to resilience capacity measurement
239 tend to struggle in this regard as the nature and relative importance of objective indicators for
240 resilience capacities vary between shock/stressor types, livelihood contexts and cultures (Béné, Al-
241 Hassan, et al. 2016; Choularton et al. 2015; Jones & Tanner 2016). For example, the factors that
242 contribute to the resilience of a pastoralist in rural Kenya are likely to be very different to those
243 needed to support the resilience of a coastal fisher; a wholly new set of indicators and
244 characteristics may be needed to assess and compare them directly.

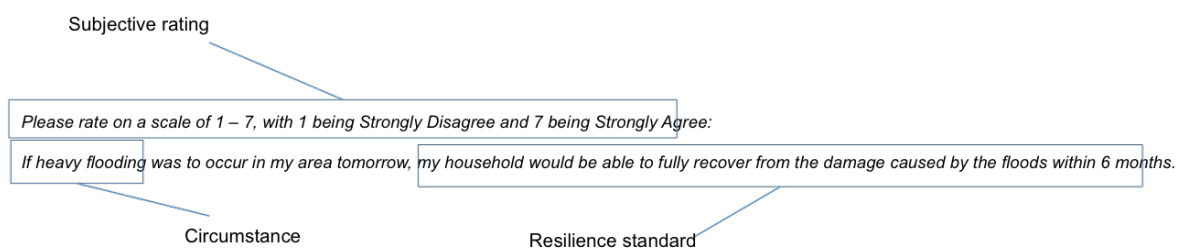
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246 Subjective appraisals of resilience level may be more appropriate for cross-cultural comparisons, as
247 they measure an individual's perception of whether their overall resilience capacities are sufficient
248 to maintain and/or improve wellbeing within the context of shocks and stressors that they currently
249 experience and are likely to experience in future. Critically, it is perceptions about the gap between
250 what currently is and what is required in future to maintain/improve wellbeing that could be
251 compared across cultures.

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253 In order to develop a measure of this 'gap', the questions must consider three components: the
254 subjective rating, the circumstances, and the outcome. For the subjective rating, respondents are
255 asked for their opinion about/confidence in their current perceived resilience capacities. This is
256 asked with respect to a circumstance, which in Figure 2's example is heavy flooding. Finally the
257 question must contain a resilience outcome about which the subjective perception is asked. In the
258 case of Figure 2 this is full recovery from flood damage within 6 months. The rating element of the
259 question can easily be made consistent across all questions using well-tested Likert scale formats.
260 Moreover, the circumstance element of each question can be tailored to local situations using
261 information on past experience of shocks and stressors, possibly combined with climatic model data.
262 Crucially, it is the nature of the resilience outcome that will influence the cross-cultural
263 comparability of subjective measures of resilience levels. Researchers now need to consider
264 whether the resilience outcome of interest should be community-derived, generalised or
265 individually-derived.

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268 *Figure 2 – Deconstructing subjective resilience appraisals in to a subjective rating, a circumstance,*
269 *and a resilience outcome*

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271 Here we present and briefly discuss these three options for the design of resilience outcomes within
272 subjective resilience level questions. It is too early to suggest which type(s) hold the most promise
273 for cross-cultural comparability. However our intention is to spark discussion around which

274 resilience outcome designs are most suitable to the various knowledge-requirements that arise in
275 studies of climate resilience.

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277 *3.3.1 A community-specific resilience outcome*

278 An approach taken by many resilience tools is to use participatory and community-based methods to
279 elucidate which local characteristics are most relevant to resilience (Barrett 2015; FAO 2015; Bene et
280 al. 2011). These are then used as resilience outcomes against which respondents compare their
281 perceived resilience level (a subjective rating) or against which objective measures are compared
282 (objective rating). The use of community-specific resilience outcomes has advantages for
283 understanding the context-specificity of resilience and the extent to which respondents within those
284 communities perceive that they fulfil locally-relevant resilience characteristics. However this
285 approach results in varying resilience outcomes being used across different communities and
286 locations, reducing the potential for cross-cultural comparability.

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289 *3.3.2 A generalised resilience outcome*

290 Another option is to use a consistent or generalised resilience outcome across multiple contrasting
291 contexts, against which respondents compare themselves. This may be helpful if, for example, the
292 aim is to compare resilience in multiple contexts against an internationally agreed definition, such as
293 full recovery within 6 months of a shock/stressor event (see Figure 2). **Importantly, it is the fact that**
294 **the same resilience outcome is used across multiple contexts that makes it 'generic', and not the**
295 **content of the outcome which, as in the example given here, may be quite specific.**

296

297 This definition of a resilience outcome is likely to be developed by experts in varying degrees of
298 collaboration with local partners. A good example from the psychological resilience field is the
299 International Resilience Project (Ungar 2008), which conducted an iterative mixed-method
300 knowledge gathering and sharing process across 14 countries to develop a series of culturally-
301 transferable statements that respondents rate their agreement with.

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303 This type of resilience outcome may be helpful to programme planners interested in whether an
304 intervention has increased a resilience capacity that they are targeting, i.e., speed of asset recovery
305 post-shock event. However it also reduces the agency of respondents to express which resilience
306 outcomes are most important to them. For example, it may be that recovery of assets to the pre-
307 existing level is less important than the time taken until all family members are able to eat three
308 meals per day.

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311 *3.3.3 An individually-derived resilience outcome*

312 A further option is to allow respondents to individually define their own resilience outcome, thus
313 addressing the aforementioned criticism of a generalised resilience outcome. This approach is used
314 in the subjective wellbeing field, which faces similar challenges to resilience in deriving cross-
315 culturally valid measures of the multi-faceted and context-specific nature of what it means to 'live a
316 good life'. A good example for the use of individually-derived outcomes, in this case for wellbeing, is
317 the Satisfaction with Life Scale (Pavot & Diener 1993; Diener et al. 1985). It is made up of the
318 following five statements, which respondents rank their agreement with on a 7-point Likert scale
319 from 1 (Strongly disagree) to 7 (Strongly agree).

- 320 ▪ In most ways my life is close to my ideal
- 321 ▪ The conditions of my life are excellent
- 322 ▪ I am satisfied with my life
- 323 ▪ So far I have gotten the important things I want in life
- 324 ▪ If I could live my life over, I would change almost nothing

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326 These statements aim to quantify the perceived gap between a respondent's current situation and
327 their ideal/satisfactory life situation, the latter of which is defined by them rather than by external
328 metrics provided by the researcher. For example, the first question probes how close the
329 respondent's life is to their ideal, without specifying what characteristics of a life might make it ideal.
330 Prompting the respondent to envision their own wellbeing standard and compare themselves
331 against it is the key design feature that facilitates cross-cultural comparisons (Pavot & Diener 1993;
332 Oishi et al. 1999).

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334 Investigating this gap between what currently is and what is needed/wanted has similarities with
335 subjective measures of resilience, which could aim to quantify the gap between current overall
336 resilience and the resilience level that the respondent deems necessary to achieve a resilience
337 outcome of their own choosing. This provides cross-cultural comparability in that it measures the
338 gap between the current perceived situation and what is desired by the individual, rather than the
339 current perceived situation and what is desired by the local-community overall (community-specific
340 outcome) or by third parties external to the community (generalised outcome).

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343 **Conclusions and recommendations**

344 Subjective approaches hold significant promise for improving our understanding of resilience from a
345 number of perspectives. There are strong precedents in the fields of psychological resilience and
346 wellbeing that psychometrically validated subjective scales can add value to objective measures, be
347 predictive of objective wellbeing outcomes and facilitate valid cross-cultural comparisons. However
348 the development of subjective measures of resilience in the climate and development field is in its
349 early stages and key uncertainties must be addressed before this approach can be adopted widely by
350 policy makers and programmers. Specifically, the structure and design of existing subjective
351 resilience level measures tend to differ from those developed for psychological resilience and
352 subjective wellbeing, in terms of their event-specificity and the future projections and/or back-
353 casting asked of respondents. Moreover, these subjective resilience level measures have not yet
354 been thoroughly tested for their validity, reliability, or their ability to predict future wellbeing.

355
356 As work expands in this area, we highlight the need to carefully consider the structure of subjective
357 resilience level questions, to include them in longitudinal studies that can test their predictive value,
358 to explore their relationship with other objective measures, and to pay attention to the resilience
359 standards against which we ask respondents to compare themselves.

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