



A Multidimensional Approach for Measuring Resilience

Oxfam GB Working Paper

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Abstract:

There is currently a wave of enthusiasm for “building resilience” in the international humanitarian and development sectors. This has coincided with a number of attempts to both define what resilience is and devise ways of measuring it. However, rather than comprehensively reviewing these attempts, the paper presents Oxfam GB’s own approach for both understanding and measuring resilience. It begins by interrogating the essence of resilience and substantiating its multidimensional nature. This is followed by describing the conceptual framework underlying the approach and how it applies the Alkire-Foster method used in the measurement of multidimensional constructs, such as poverty and women’s empowerment. Thereafter, the approach’s utility in informing situational analyses, outcome tracking, and impact evaluations is described, using primary data collected from an agro-pastoral population residing in Ethiopia’s Somali Region. A critical review of its strengths and limitations then follows.

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1. Introduction

Given the increased frequency and scale of both natural and human induced disasters and shocks in recent years (IPCC 2012), there is currently a wave of enthusiasm for “building resilience”. Indeed, it is hoped that, through the undertaking of such efforts, the negative impacts of such disasters and shocks will be less severe. Some even see resilience as something that goes beyond helping poor people to “bounce back”. On the contrary, for many humanitarian and development actors, resilient households and communities are those that are effectively working themselves out of poverty for the long-haul, in spite of any immediate setbacks they may face.

Notwithstanding the growing enthusiasm for promoting resilience, there is currently no agreement on how this construct is defined, let alone how it can be measured (Mayunga 2007). However, the focus of this paper is not to review the various attempts made thus far to do so. Rather, its purpose is to present Oxfam GB’s own conceptual framework for both understanding and measuring resilience.

It is important to note that while the conceptual framework presented in this working paper represents a genuine attempt to improve our cross-sectoral programming, it is very much a work in progress and the approach outlined and findings presented represent work to-date on a very live and dynamic initiative. It is clear that stronger empirical evidence illustrating what factors consistently contribute to resilience, to what types of shocks and in what contexts, will enhance the characteristics approach presented here and it is our intent to invest in learning, refinement and development as the body of research on the determinants of resilience and adaptive capacity grows. Such evidence can be used both for planning and programming purposes as well as for assessing programme impact.

The utility of the characteristics approach as a programme design and/or outcome monitoring tool has, not as yet been “tested” and this is therefore, an area for further work. Further limitations that are being addressed include exploring pragmatic ways of better theoretically and empirically validating the particular set of “resilience characteristics” defined for a particular context. This is to be complemented with identifying improved ways of measuring many of the characteristics as well as strengthening aspects of governance and power relations within and outside the community and gender within the framework dimensions. More work is needed, particularly on how this can be made practical. We will continue to test the assumption that it is possible to have a consistent approach to measuring resilience and we recognise the need to consider broader contextual dynamics in levels above the household and community and the challenge this poses in terms of any measurement approach.

The resilience dimensions have been used to frame the internal debate on resilience and have helped to identify gaps in Oxfam’s current programming. We recognise the need to develop the framework further and continue efforts to enhance a ‘one-programme approach’.

The working paper is presented in six sections follow this introduction. Section 2 starts by laying the paper’s foundation by interrogating the essence of resilience and substantiating its multidimensional nature. This is followed by Section 3, where Oxfam GB’s conceptual framework for measuring resilience is presented. This framework makes use of the Alkire-Foster method used by the Oxford Poverty and Human Development Initiative (OPHI) and other organisations to measure multidimensional constructs, such as poverty and women’s empowerment. Consequently, Section 4 is devoted to explaining this approach and how it is applied to the framework. Section 5 follows by presenting the potential applications of the approach in informing situational analyses, outcome tracking, and impact evaluations. This is done using primary data collected from an agro-pastoral population residing in Ethiopia’s Somali Region. Section 6 then follows with a critical review of the strengths and limitations of the approach, while Section 7 offers suggestions for further work and concludes the paper.

2. An expanded and multidimensional understanding of resilience for humanitarian and development contexts

In this section, attempts are not made to propose a universal definition of resilience. However, in order for the reader to make sense of Oxfam GB's conceptual framework presented in the next section, it is important to briefly interrogate this rather amorphous construct. This section advocates for a broad, multidimensional understanding of resilience, particularly in the context of humanitarian and development programming.

What does it mean to be resilient in a poverty stricken context? In the literature, resilience is often defined as – borrowing heavily from the field of ecology – the ability of a system (e.g. a household or a community) to maintain its core functions in times of stress, shocks, disturbances, etc. (Adger et al. 2005). This is where the notion of “bouncing back” referenced in the introductory section comes from. But, for a poverty stricken household, should a return to the status quo be something we should be aspiring to achieve? For Oxfam, the answer is categorically no. As implied by the framework presented in the next section, poverty is seen as antithetical to resilience. Consequently, building resilience in the context of poverty must, at least in significant part, involve reduction of poverty and inequality. In other words, livelihood strengthening should be an integral part of promoting resilience in such contexts.

However, this is not all that is needed. Most contexts in which poor people reside are by no means static, and are, arguably, likely to become increasingly less so into the future. Climate change is obviously one of the key drivers underlying this, but globalisation, population pressure, conflict, and a host of other factors are also playing a role. In such contexts, what has worked well in the past may not work in the future. As is all too evident in the business sector, the maxim “adapt or perish” rules the day. Many therefore also see adaptation as a critical component of resilience (FAO 2011). Historically within Oxfam GB, resilience and adaptation were treated separately, with the former being associated primarily with disaster risk reduction (DRR) efforts. However, the organisation has now endorsed a broader understanding of resilience that accommodates both the concepts of DRR and adaptation. Oxfam understands that the needs of the poorest must be prioritised for the effective reduction of poverty and inequality. Therefore the ability for a community to represent itself to decision makers is a critical aspect of resilience.

Many poor and vulnerable populations will likely experience increasingly severe shocks and stresses in the future. However, it would be naive for us to assume that we can develop the capacity of local communities to independently cope with and/or recover from all of them. External humanitarian intervention, therefore, will likely continue to be critical in many cases – no matter how successful our risk reduction and adaptation efforts are at the local level. Developing the capacity of relevant national and local level duty bearers (e.g. district level state institutions) to provide support in times of extreme crisis is also an integral part of building resilience.

Shoddy infrastructure and degraded natural resources and ecosystems are further both less able to absorb shocks (Dodman et al. 2009) and may rule out critical adaptation opportunities, e.g. through restricting access to markets or limiting the production of new commodities. Hence, developing resilient physical infrastructure, ensuring ecosystem protection, and promoting sustainable natural resource management practices are also integral to resilience promotion. From the above, it is therefore clear that building resilience does not simply mean doing one thing, such as strengthening livelihoods. Rather, it is a multifaceted, multidimensional construct that must be understood and tackled from various angles. The following section presents Oxfam GB's attempt to develop a measurement framework for resilience that is based on such a multidimensional understanding.

3. Oxfam GB's conceptual framework for measuring resilience

One reason why measuring concepts such as resilience and adaptive capacity is challenging is because we can only really assess whether a system has successfully coped or adapted after the fact (Dodman et al. 2009). In other words, we have to wait until after the shock or change has taken place in order to assess the effectiveness of the intervention in question.

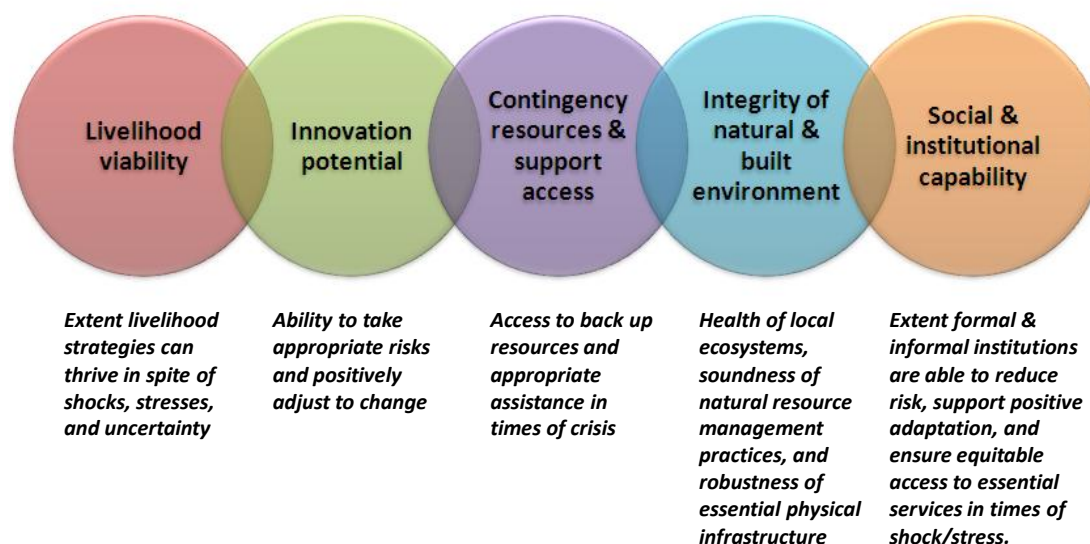
The characteristic approach – initially conceptualised by Twigg (2009) – attempts to get around this issue by hypothesising that there are particular characteristics of households (and even communities, organisations, governments, etc.) that affect how well they are able to cope with shocks, positively adapt to change and demand their rights. A limitation, of course, is that – for any given context – we do not know for certain what these characteristics actually are. Rather, we hypothesise that some are likely to be important based on common sense, theory, and/or field experience. However, as is emphasised below, carrying out complementary primary and secondary research is necessary to meaningfully operationalise the framework presented in this section. It is further recommended that the “smorgasbord” of potential characteristics be continuously updated, particularly as the body of research on the determinants of resilience grows.

Drawing heavily on from the work pioneered by the Africa Climate Change Resilience Alliance (ACCRA), the characteristics associated with Oxfam GB's measurement framework fall under the five interrelated dimensions presented in Figure 3.1. First, if we think about what a household would need in order to cope with current and future shocks, stresses, and uncertainty, a viable livelihood is likely one of them. If a shock happens, for instance, a household dependent on just one precarious livelihood activity will likely be more negatively affected than another that has one or more less sensitive alternatives to fall back on – *all other things being equal*. In addition, households that are on the margins of survival are less likely to be resilient than their relatively more wealthy counterparts. Where longer-term climatic trend prediction information exists, it is also important to assess how viable current livelihood strategies would be given the range of likely future climatic scenarios.

Innovation potential is different and, hence, a separate dimension. It is focused on a household's ability to positively adjust to change, whether anticipated or not. We can hypothesise that such potential is dependent on factors such as people's knowledge and attitudes, their ability to take risks, and their access to weather prediction and market information and relevant technology and resources.

FIGURE 3.1:

Dimensions affecting the ability of households and communities to minimise risks from shocks and adapt to emerging trends and uncertainty



Moreover, there will likely be times when even households with the most viable and adaptive livelihood strategies will find it tough to get by. Access to contingency resources and external support – e.g. savings, food and seed reserves, social protection, kin and non-kin support networks, emergency services etc. – are, therefore, likely to be critical in supporting households to cope with shocks and positively adjust to change.

As mentioned in Section 2, it is recognised that healthy ecosystems are better able to cope/adjust to climatic shocks/change than are those that are relatively more degraded. We may reasonably assume – again, with all other things being equal – that households whose livelihoods are dependent on healthy ecosystems will be in a better position to adjust to shocks and change than those that are not. The presence of appropriate infrastructure (e.g. pit latrines and roads) that is resilient to shocks and stresses (e.g. flooding) is also important: if critical infrastructure no longer functions or collapses in times shocks and stress, the livelihoods and/or health of community members can be negatively affected. Adaptation opportunities may also be restricted.

However, in most, if not all cases, it is necessary to look beyond the household level when examining resilience. Indeed, it is reasonable to assume that households are likely better able to successfully adjust to shocks, disturbances, and change when they are part of larger coordinated efforts at the community level and beyond. The social and institutional capability dimension, in particular, is concerned with the effectiveness of formal and informal institutions in reducing risk, supporting positive adaptation, and ensuring equitable access to essential services in times of crisis. In the absence of this capability, we can assume that local and non-local duty bearers will be less effective in fulfilling their responsibilities in supporting community members to reduce risk and/or successfully adapt. Critically, how well women and men at risk or suffering a shock can claim their rights from these institutions, determines their resilience.

In most contexts, several “resilience characteristics” falling under each of the five dimensions presented in Figure 3.1 will likely be relevant. However, no “one size fits all”; that is, many of the characteristics appropriate for one population (e.g. slum dwellers in Mumbai, India) may not be so for another (e.g. Bolivian shifting cultivationists). Consequently, each particular suite of

characteristics needs to be appropriately specified, given the nature of the population in question and the hazards and change processes to which it will likely be subjected. The characteristics, then, cannot simply be selected from a generic or predefined list. Complementary research efforts are needed, including contextually grounded risk and trend analysis.

The following section describes how data for each “resilience characteristic” defined under the above framework are brought together and analysed using the Alkire-Foster method. This method has been used by the Oxford Poverty and Human Development Initiative (OPHI) to analyse data collected in over 100 countries to measure multidimensional poverty. It is also being used by a number of organisations (including Oxfam GB) to measure women’s empowerment.

4. Applying the Alkire-Foster method to the conceptual framework

This section begins by briefly describing the Alkire-Foster method and how it is used to measure multi-dimensional poverty. How it is applied to Oxfam GB’s resilience measurement framework is then described, using data collected from an agro-pastoral context in Ethiopia’s Somali Region.

4.1 A brief introduction to the Alkire-Foster method

A more thorough and technical treatment of the Alkire-Foster method and its use in the measurement of multidimensional poverty can be found in Alkire and Foster (2011). However, in order to make its application to the conceptual framework presented in Section 3 clear, it is briefly summarised here. The method involves developing several composite indices based on a number of indicators that reflect various manifestations of the multidimensional construct of interest, e.g. poverty. The international Multidimensional Poverty Index (MPI), for instance, is based on 10 indicators that fall under three dimensions, as presented in Figure 4.1 (Alkire and Santos 2010).

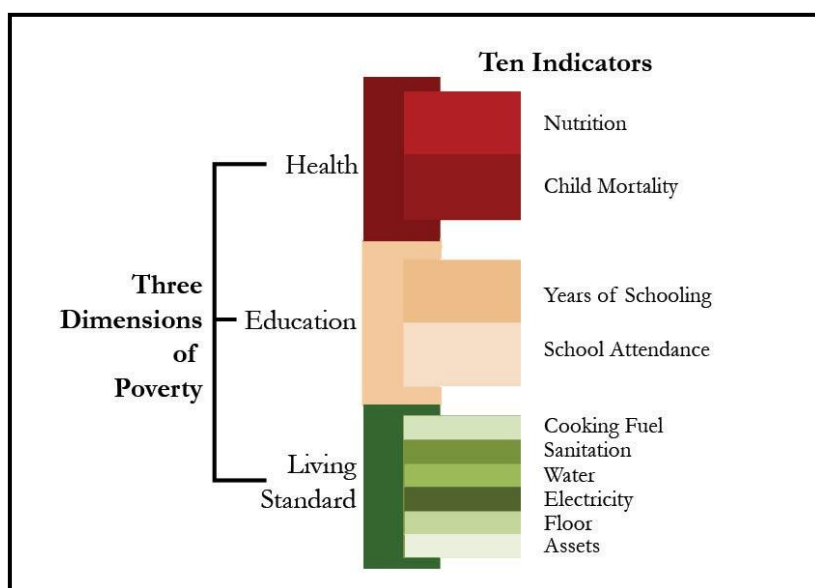


Figure 4.1: Dimensions and Indicators of the International MPI

Under the Alkire-Foster method, binary cut-offs are specified for each indicator. For example, for the international MPI, an individual is considered as being deprived in nutrition if *any* adult or child the household s/he resides in is malnourished and non-deprived if otherwise. Weights are then assigned to each indicator. These are typically derived by first defining weights for the higher-level dimensions. For the international MPI, each dimension is weighted equally and so too are the indicators that fall under them. Six of this index’s indicators are under the living standards dimension. Consequently, each of these indicators is given less weight than those falling under the other two dimensions.

An initial composite index (called the “counting vector”) is subsequently constructed by adding the weighted indicators together for each observation. This index represents the weighted percentage of the indicators each individual is deprived in. Hence, if an individual is deprived in all 10 indicators, s/he will score 1 on the index and 0 if s/he is not deprived in any. Empirically, most individuals fall somewhere in between.

The hallmark of the Alkire-Foster method is the next step. Here, an overall cut-off for the counting vector is defined. For the international MPI, this cut-off is set at one-third of the weighted indicators. More specifically, if an individual is deprived in one-third or more of these indicators, s/he is considered to be multi-dimensionally poor and non-poor if otherwise. When the actual MPI is constructed, the index score for those defined as multi-dimensionally poor is equivalent to the percentage of the weighted indicators they are deprived in. However, those deprived in less than one-third of the weighted indicators (i.e. the non-multidimensionally poor) are given scores of zero. This has the effect of censoring their levels of indicator deprivation in the index.

As a result, the international MPI reflects *both* the headcount (proportion) of those who are multi-dimensionally poor (H) and the average proportion of weighted indicators the multi-dimensionally poor are deprived in (A), i.e. $MPI = H \times A$. Hence, if either the percentage of those defined as multidimensionally poor drops or the percentage of weighted indicators the poor are deprived in goes down, the MPI will decrease accordingly and vice-versa (Alkire and Santos 2010).

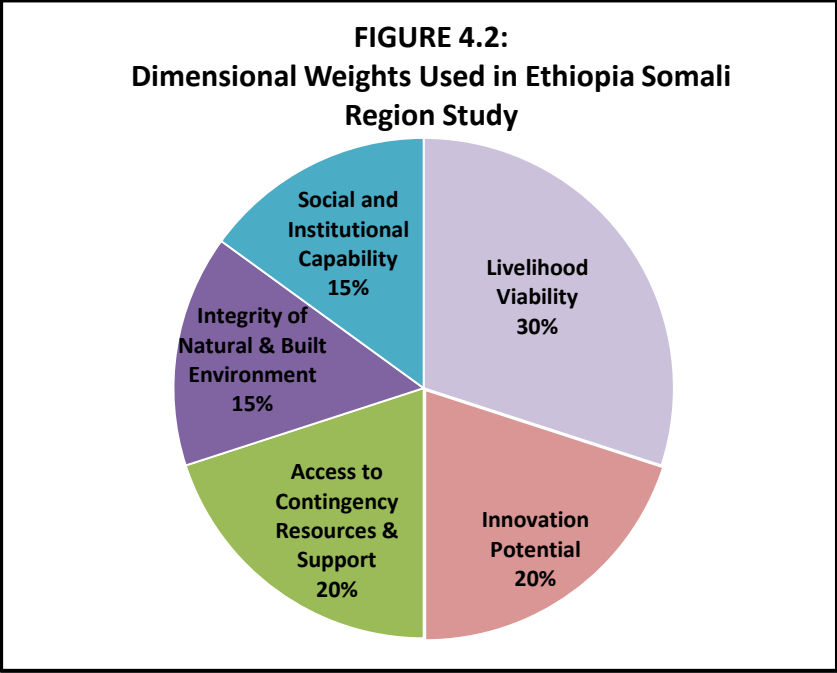
4.2 Application to resilience measurement framework

The following subsection describes how the Alkire-Foster method is applied to the conceptual framework presented in Section 3. However, rather than doing so in the abstract, the particular steps used to analyse data collected as part of an ex-post impact evaluation of two DRR projects implemented in an agro-pastoral setting in Ethiopia’s Somali Region are described.

Data pertaining to a total of 37 “resilience characteristics” were collected in the Ethiopia study. These are presented in Appendix 1, together with a short rationale why each was included from a resilience perspective. As described above, one of the key steps in the Alkire-Foster method is to define binary cut-offs for each indicator (or characteristics in this case). These cut-offs are presented in Appendix 2. There was, inevitably, a degree of arbitrariness in defining these cut-offs, but they were reviewed and agreed with Oxfam field staff. It is also important to note that, under this approach, a household is given a value of 1 if it is non-deprived on the characteristic in question, i.e. above the cut-off, and 0 if it is deprived. The opposite is the case for the MPI, where individuals are coded with 1 if deprived and 0 if non-deprived. This difference exists simply because resilience is defined positively, rather than negatively.

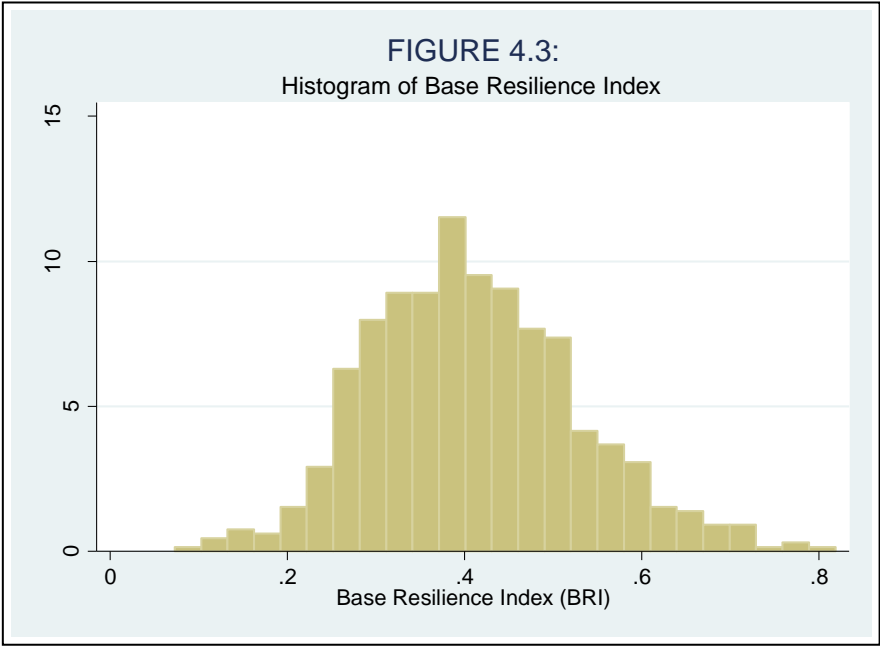
Weights were then assigned to each of the 37 characteristics. This was done by first specifying weights for the five dimensions of the resilience framework presented in Section 3. Figure 4.2 presents the specific weights defined for each dimension. Note how the dimensions are not weighted equally, something which requires justification.¹ As will be explained in Section 5, the livelihoods of the targeted population are highly susceptible to the severe droughts and other shocks that regularly strike Ethiopia’s Somali Region. Consequently, developing strong livelihoods that can still thrive in such a context is absolutely critical, hence, justifying the greater weight given to the livelihood viability dimension.

¹ There is no reason why the weights for either the dimensions or specific characteristics cannot be defined through stakeholder consultation and/or participatory processes. In this case, however, attempts were made to theoretically justify the weighting scheme.



At the same time, climate change is a reality, making both adaptation and ensuring access to resources and support during times of crisis clear priorities. Consequently, the innovation potential and access to contingency resources and support dimensions are each weighted at 20 per cent. The integrity of the natural environment in the context is important but directly relates to securing viable livelihoods. As such, it is strongly connected to the livelihood viability dimension, resulting in it being given less weight. Finally, the ability of the targeted households to cope effectively with stress and adapt to emerging trends and uncertainty is assumed to be more influenced by their own characteristics and efforts, rather than those of local leaders and institutions. Less weight was therefore also given to the social and institutional capability dimension.

As is the case for the international MPI, each characteristic was weighted equally under each dimension. What is referred to in this paper as the “Base Resilience Index” (BRI) was subsequently constructed by adding the weighted indicators together for each household. Figure 4.3 is a histogram of the BRI for the study’s entire dataset (of 651 households). As can be seen, no household scored positively or negatively on all of the 37 weighted indicators. It is also clear that there is considerable variation in the scores.



As presented in the previous section, the next step in the Alkire-Foster method is to define an overall binary cut-off for the entire weighted index. Given that resilience is defined positively, households above this cut-off are considered “resilient”, given that they are only deprived in a relatively small weighted proportion of the indicators. As is the case for the dimensional and indicator specific weights, it is important to provide a normative justification for the overall cut-off used. As mentioned in the previous subsection, in the case of the international MPI, the overall cut-off is set at one-third, i.e. those deprived in less than one-third of the weighted indicators are defined as non-multi-dimensionally poor. The rationale here is that one-third is equivalent to one of the three dimensions used to construct the MPI, i.e. an individual needs to be deprived in the percentage of the weighted indicators that is equivalent to at least an entire dimension in order to be defined as multi-dimensionally poor (Alkire and Santos 2010).

The case was less straightforward in the Ethiopia Somali Region study, given that the five dimensions are not weighted equally. However, an overall cut-off of two-thirds was used, given that this represents a significantly large percentage of the weighted indicators a household needs to score positively on for it to be considered “resilient”. That being said, for the entire dataset, only two per cent of households exceeded this overall cut-off on the BRI; that is, 98 per cent under-performed on one-third or more of the weighted indicators.

Despite this, efforts were made to construct an index similar to the international MPI, albeit defined in a positive, rather than negative, sense. When this index was created – *referred to as the Alkire-Foster (AF) Resilience Index in this paper* – all those above the overall cut-off were given a score of one (the maximum possible score on the index) and the scores for those that are either at or below this cut-off remained as the weighted percentage of characteristics they are non-deprived in. Hence, the AF Resilience Index reflects *both* the percentage of households that are considered resilient and the depth of resilience among the non-resilient.

Oxfam’s Global Resilience Outcome Indicator is directly informed by the AF Resilience Index. For ease of communication, it is defined as *the percentage of households demonstrating greater ability to reduce risk and adapt to emerging trends and uncertainty*. When it is actually computed, it equates to the percentage of supported households scoring higher on the AF Resilience Index than the typical household (as defined by the median) of the comparison population.

With the steps involved in applying the Alkire-Foster method to the conceptual framework presented in Section 3 now described, the next section presents the actual results for the Ethiopia Somali Region dataset. This is intended to illustrate its utility for informing situational analyses, monitoring change over time, and carrying out impact evaluations.

5. Potential applications using data from Ethiopia’s Somali Region

5.1 Informing situational analyses and monitoring change over time

The population of Ethiopia’s Somali Region are vulnerable to variety of shocks, including, but not limited to, severe droughts, disease, periodic bans on livestock imports by the Gulf states, and conflict (Devereux 2006). Arguably, then, this region is in need of resilience building support. However, what should this support entail? As is good programmatic practice, the starting point in answering this question should be a thorough situational analysis. This could involve a number of activities, ranging from a literature review and expert consultations to facilitating participatory analysis exercises with local communities, administering surveys, and analysing secondary data.

One specific approach could involve first reviewing literature, consulting communities, and the like, followed by applying the resilience measurement framework presented in this paper. Here, the information gathered through the former activities would be used to specify characteristics falling

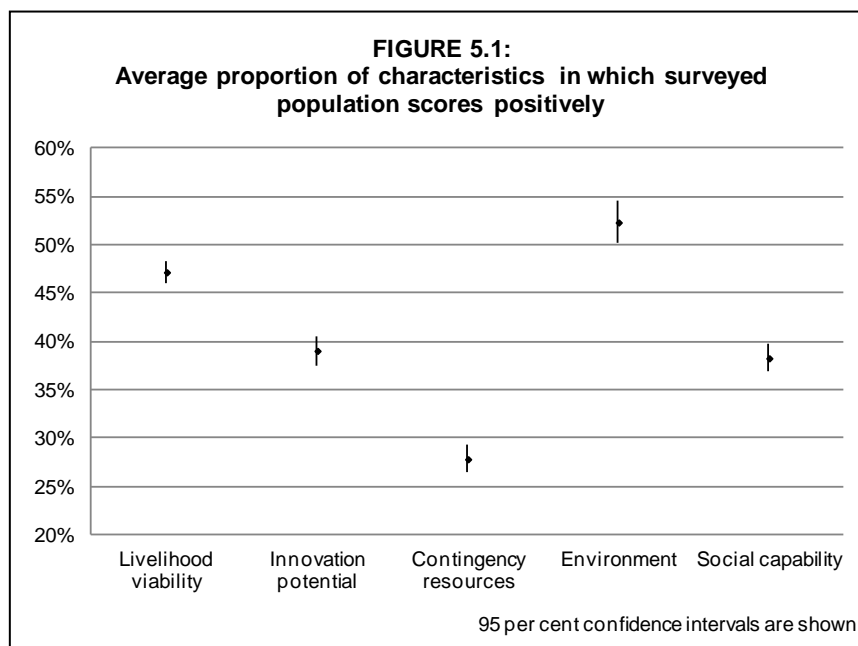
under each of the five dimensions. A household survey could then be administered to capture data on these characteristics, followed by the application of the Alkire-Foster method.

Oxfam GB did not pursue this approach in Ethiopia’s Somali Region. However, let us assume, at least for the time being, that the data collected as part of the abovementioned single-difference, ex-post impact evaluation were actual baseline data. When applied to entire Somali Region dataset ($n=651$), a Base Resilience Index (BRI) score of 0.411 was derived. This means that, on average, this population scored positively on only 41 per cent of the weighted indicators.

As noted in Section 4, only a small percentage of households scored positively on more than two-thirds of the weighted indicators. Consequently, the mean calculated for the AF Resilience Index – 0.418 – is very similar to the mean of the BRI. Of course, if a higher proportion of households had surpassed the overall cut-off, the mean of the AF Resilience Index would have been significantly higher.

Aside from revealing that there are a significant number of resilience characteristics this population is deprived in, both indices, by themselves, do not provide much in the way of additional information. However, it is worth pointing out that these statistics can be decomposed to lower geographic units, provided that the sample sizes obtained for these units are of sufficient size. This would enable the identification of less resilient sub-populations for programmatic prioritisation. Such spatial mapping has been done extensively for the international MPI and its related measures (Alkire et al. 2011).

There are further possibilities to disaggregate results by dimension and characteristic. Figure 5.1, for instance, displays the average proportions of characteristics the surveyed population is non-deprived in by dimension. According to these data, the population is, on average, relatively worse off on the social and institutional capability dimension and relatively better off on the integrity of the natural and built environment dimension.



It is further possible to disaggregate the data by resilience characteristic. This can simply be done by examining the proportion of households that are non-deprived in each characteristic. The stacked column graph presented in Appendix 3 is another option. It presents the average percentage of characteristics the population is non-deprived in, disaggregated by district. Moreover, each characteristic is also presented in ranked order from most deprived to least deprived. It is clear from the graph, for instance, that only a very small proportion of households reported being well

informed about drought preparedness issues, while the vast majority reported experiencing little problems in accessing grazing land and markets (at least during the 12 month period prior to being interviewed). While it may be too simplistic to design a programme around, say, addressing only the top most deprived characteristics, this is clearly useful information – both for identifying key issues and tracking change over time.

5.2 Use in impact evaluations

As mentioned above, the data collection exercise in Ethiopia’s Somali Region was not part of a new situational analysis. Rather, it was part of an ex-post impact evaluation of two drought risk reduction projects. A more rigorous impact evaluation design would have involved carrying out a baseline survey in *both* areas targeted by these projects and other similar comparison areas. Comparative changes in the various indices and characteristics over time could then be examined. And even greater rigour could have been achieved if the intervention sites had been selected at random.² However, in actual fact, the impact of the two projects was evaluated using a single difference, quasi-experimental design. Here, data were collected from 11 intervention villages and 13 purposely matched comparison villages, and two statistical methods – propensity score matching and multivariable regression – were used to control measured differences between these two groups. Further details of this study can be found in Hughes and Fuller (2013).

Table 5.1 presents a comparison of the intervention and comparison households for both the Base Resilience Index and the Alkire-Foster Resilience Index.³ As is evident, statistically significant differences were identified in favour of the general intervention population for both indices.⁴ While this provides some evidence that the projects did something positive, it is important to analyse the data further to explore what is driving this difference, i.e. identify which of the characteristics, in particular, the projects affected.

TABLE 5.1: Overall Resilience Indices – Intervention HHs versus Comparison HHs

	Base resilience index (BRI)	Alkire-Foster Resilience Index
Unadjusted		
Sample mean	0.411	0.418
General intervention population mean:	0.436	0.448
Comparison population mean:	0.400	0.405
Unadjusted difference :	0.0356*** (3.58)	0.0431*** (3.40)
Observations:	651	651
PSM		
Post-matching difference: (kernel)	0.0446*** (4.34)	0.0527*** (4.19)
Observations:	643	643
Multivariable Regression		
OLS coefficient : (robust standard errors)	0.0467*** (5.06)	0.0564*** (4.80)
Observations:	642	642

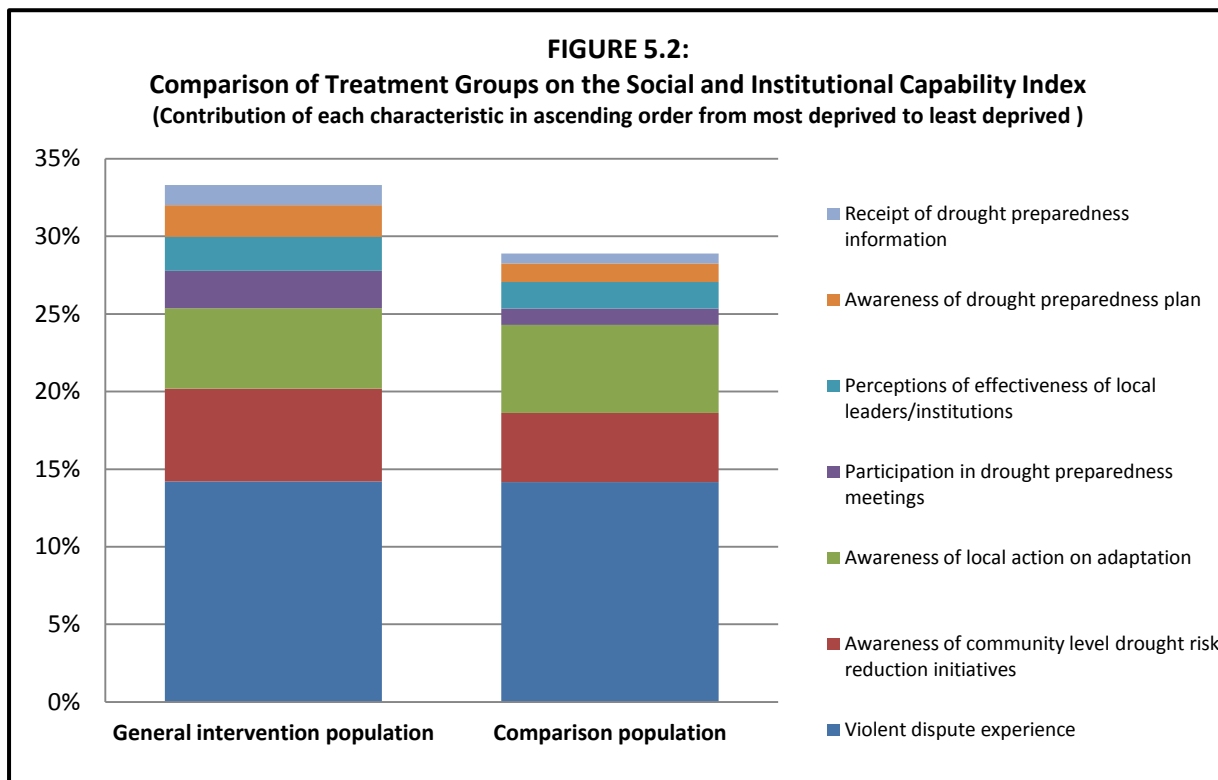
² The former approach without random assignment is called a difference-in-differences design. It is effective in controlling for time invariant differences between the intervention and comparison groups. The second approach is called a clustered randomised control trial. If implemented well, the intervention and comparison populations would be similar in all respects, save their exposure to the projects, thereby, ruling out both observable and unobservable sources of bias (Khandker et al. 2010).

³ Data were also collected from a specific subgroup of programme participants that were targeted by the projects’ pastoral field school intervention. However, this subgroup was left out of this analysis, given that it represents a unique subset of the general intervention population, and its members are, consequently, not comparable with the “average” person in the comparison villages.

⁴ While the identified effect sizes appear small, it is worth pointing out that they are moderately robust to omitted variable bias. Sensitivity analysis, for instance, was carried out on a PSM nearest neighbour matching estimate (0.0644) derived for the AF Resilience Index using Stata’s *rbounds* command. This test revealed that it would take the presence of omitted variable bias at a log odds ratio of 1.8 in favour of the general intervention population to render this identified effect estimate statistically insignificant.

t statistics in parentheses
 * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
 PSM estimates bootstrapped 1000 repetitions.
 Covariates used in PSM and OLS models are presented in Appendix 4.
 Coefficients for covariates used in OLS models are not presented.

Figure 5.2 is another stacked column graph that illustrates one of the ways this can be done. It compares the intervention and comparison population on an index that was developed specifically for the social and institutional capability dimension. This index pertains to the percentage of characteristics falling under this dimension (non-weighted) that the intervention and comparison households are non-deprived in. While the general intervention population scored better on this index than the comparison population (a difference which remains statistically significant following the application of PSM and multivariable regression), it is clear that the former is, nevertheless, in poor shape with respect to the first two characteristics.



6. Critical review of the strengths and limitations of the approach

Despite its advantages, the approach described in this paper for both conceptualising and measuring resilience is, by no means, a panacea: there are inherent limitations, and it does not eliminate the need for undertaking complementary investigation (e.g. literature reviews, community consultation, risk analysis, and follow-up qualitative research). In this section, both the strengths and shortfalls of the approach are briefly discussed.

Few would argue against the fact that many of the determinants of resilience – regardless of how this construct is defined or conceptualised – vary by context. One of the advantages, then, of the measurement framework is its flexibility. While it encourages a holistic approach by specifying five interrelated dimensions, the specific characteristics used are intended to be very much context specific. Hence, it has the potential for wide and flexible application. As described in Section 5, it is also compatible with other methods for assessing and measuring resilience, e.g. participatory exercises and other forms of qualitative research. The approach’s second strength, as reviewed in Section 3, is that it enables resilience to be measured “before the fact”, thereby, enabling the effectiveness of interventions to be evaluated before the onset of the shock and/or change process

in question. Finally, the approach has the potential for generating information relevant for both policy makers and programme managers, hopefully in a way that can be relatively easily understood.

However, despite these three core strengths, at least six limitations deserve mention. The first is the flipside of the first strength noted above: significant effort is needed to identify the specific characteristics that are relevant to the context in question; that is, the measurement framework does not liberate the researcher/programme team from having to undertake complementary research and analysis. Moreover, no matter how thorough such complementary efforts are, there will likely remain significant uncertainty on which characteristics are necessarily relevant for the context. A second and related limitation is that many of the characteristics are inherently challenging to measure. Several characteristics, for example, are only practically measurable with perception and/or self-reported data, which are known to be fraught with measurement error. A third and, again, related limitation is that data are captured from a household perspective only. While this can provide useful information (e.g. revealing the degree of confidence community members have in their local leaders and institutions), the status of many characteristics (e.g. district institutional capacity for providing quality support in times of crisis) are, arguably, better measured with other approaches.

A fourth limitation – related again to the fact that the characteristics are contextually defined – is that the level of resilience of various populations cannot be directly compared, at least when different characteristics and/or cut-offs are used. This is different for indices, such as the international MPI, that capture data on a common set of indicators. A fifth limitation is that the approach does not differentiate characteristics according to their position along the causal pathway to the ultimate outcome – increased ability to reduce risk and adapt to emerging trends and uncertainty. It is possible, for instance, for one population to have higher index scores than another because it is better off in relation to a number of “lower level” characteristics (e.g. receipt of drought preparedness information), despite the fact that the other population is actually better off in relation to one or more “higher level” characteristic (e.g. livelihood diversification). While addressing this is not insuperable, it does require that complementary analysis be carried out.

A final issue worthy of discussion relates to the added value of constructing and using the AF Resilience Index, either as a complement to the Base Resilience Index or something that supersedes it in terms of its policy and/or programmatic importance. Recall that the AF Resilience Index is derived from the Base Resilience Index by censoring information for all those above the overall two-third cut-off. That is, for those households above this cut-off, the precise proportion of the weighted characteristics they are deprived in is replaced with a value of 1. This has the effect of making the AF Resilience index higher in value than the Base Resilience Index, particularly when a significant proportion of households exceed the overall cut-off. It further draws attention to the “depth of resilience” among those households that are at or below the overall resilience cut-off. In the case of the Ethiopia Somali Region data, however, only two per cent of households surpassed the two-third overall cut-off, thereby, making the use of *both* the Base Resilience Index and AF Resilience Index somewhat redundant. This issue may also arise for other populations characterised by both high levels of deprivation and homogeneity.

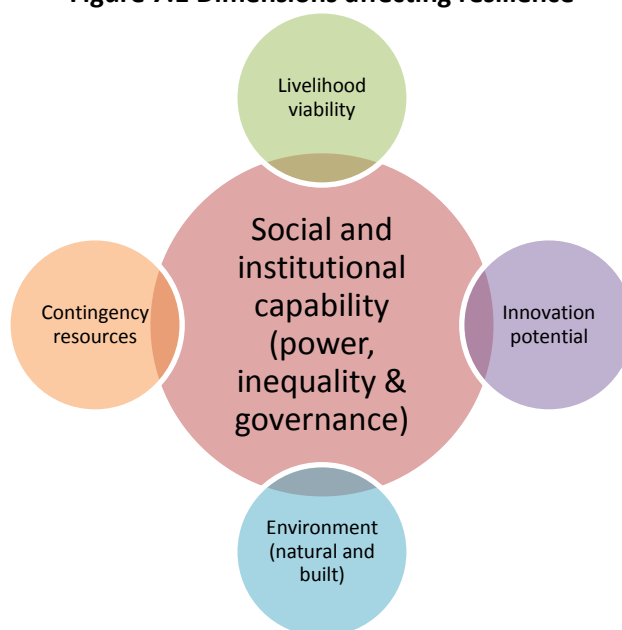
7. Further work and conclusion

7.1 Further work

To date, Oxfam GB has only applied the approach to measuring resilience described in this paper to several single different, ex-post impact evaluation studies. Its utility as a programme design and/or outcome monitoring tool has, consequently, never been “tested”, despite the fact that there is considerable internal interest in doing so. This is, therefore, an area for further work. Another is to explore pragmatic ways of better theoretically and empirically validating the particular set of

“resilience characteristics” defined for a particular context. Carrying out literature reviews, complementary qualitative research, risk analysis, community consultations, and so forth should all be part of this effort, and it is hoped that this can be systematised.⁵ This is to be complemented with identifying improved ways of measuring many of the characteristics, including moving beyond only collecting data through household surveys. Finally, there are two key areas where the framework itself needs to be developed. The first is around the issue of governance and voice, recognising that the ability of women and men to engage with formal and informal institutions to demand their rights is key to their resilience, and further work is needed to incorporate this into the framework dimensions in a meaningful way. The second is gender. While consideration has been given to identifying meaningful ways of mainstreaming gender issues into the measurement framework, more work is needed, particularly on how this can be made practical. Figure 7.1 gives a visual representation of what the framework may look like with these developments, emphasising the centrality of governance and power in relation to building resilience.

Figure 7.1 Dimensions affecting resilience



7.2 Conclusion

This paper has attempted to address a current and important need by presenting a multidimensional approach for conceptualising and measuring resilience that is both informative and practical. This involved first demonstrating why resilience is inherently multidimensional in nature, relating to not only viable livelihoods but also adaptive capacity, the potential for accessing resources and support in times of crisis, ecosystem and infrastructural integrity, and local and non-local institutional capacity. Oxfam’s conceptual framework relating to these five interrelated dimensions was then presented, followed by a description of the Alkire-Foster method and how it can be applied to this framework. Potential applications, using data collected from Ethiopia’s Somali Region, for informing situational analyses, outcome tracking, and impact evaluations were thereafter demonstrated. The preceding section then went on to review the primary strengths and limitations of the approach.

⁵ One way of doing this (currently under internal discussion) is through blending the approach with Oxfam’s Participatory Capacity and Vulnerability Analysis (PCVA) tool. See: <http://policy-practice.oxfam.org.uk/publications/participatory-capacity-and-vulnerability-analysis-a-practitioners-guide-232411>

The task of measuring (let alone building) resilience is incredibly challenging, fraught with methodological challenges and measurement issues. However, bearing in mind the inherent limitations, it is hoped that this paper has made a significant contribution by describing an approach that is both doable and flexible, with potential utility for both policy makers and practitioners alike.

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APPENDIX 1: Specific Resilience Characteristics Used in the Ethiopia Somali Region Agro-Pastoral Impact Evaluation Study

Dimension	Characteristic	Rational for Inclusion
Livelihood Viability	Household wealth status	Poor households assumed to be more at risk
	Household food security	Food insecure HHs assumed to have less viable livelihoods
	Household dietary diversity	HHs with poorer nutrition assumed to be more at risk
	Livelihood diversification	HHs with more diverse livelihoods assumed to be at less risk
	Gender risk differential	Differential gender impacts of shocks assumed negative
	Crop portfolio	More diversity, more drought tolerant crops = less risk
	Livestock portfolio	More diversity + more drought tolerant livestock = less risk
	Livestock herd size	The larger the herd size, the less the impact of livestock loss
	Ownership of pack animal	Means of transport to market, thereby enhancing access
	Livestock lost to disease	More experience of disease = less healthy livestock
	Livestock lost to drought	Direct indicator of susceptibility to impacts of drought
	Livestock vaccination	More healthy livestock assumed to be more tolerant
	Access to drought warning information	Enables the household to plan and reduce risk
Drought preparedness practice	Indicates that the household is proactive to minimising risk	
Innovation Potential	Attitudes towards new livelihood practices	HHs less open to new practices are less likely to innovate
	Awareness of climate change	HHs with more awareness in better position to adapt
	Innovation practice	Direct indicator that HH is innovative
	Access to credit	Enables HH to access resources to support innovation
	Access to state innovative support	Sustainable access to such support conducive for innovation
Access to Contingency Resources and Support	Market access	Better access to markets = more livelihood opportunities
	Group participation	More opportunities for support in times of crises
	Social connectivity	More opportunities for support in times of crises
	Perceptions of local government emergency support	Level of confidence of HHs assumed related to what will actually happen in times of crises
	Savings	More savings a HH has, the more it can cope in crises
Integrity of the Natural and Built Environment	Remittances or formal earnings	Better access to remittances = better coping in crises
	Ownership of fungible livestock	Enables HHs to get by in times of crises (“HH bank”)
	Extent of soil erosion	High levels of soil erosion decreases productive
	Access to irrigation for farming	Enables yields to be maintained despite rainfall variability
Social & Institutional Capability	Access to water for livestock/consumption	More difficulties in access makes it more difficult to cope
	Access to grazing land	More difficulties in access makes it more difficult to cope
	Awareness of drought preparedness plan	Indicates planning is taking place + public participation
	Participation in drought prep. meetings	Indicates planning is taking place + public participation
	Receipt of drought prep. information	Indicates that community institutions are fulfilling roles
	Awareness of community level drought risk reduction initiatives	Indicates that community institutions are fulfilling roles
	Violent dispute experience	Levels of conflict reflects capacity to address disputes
	Awareness of local leader/community institution in supporting adaptation	Indicates that community institutions are fulfilling roles
Perceptions of effectiveness of local leaders/institutions	Level of confidence of HHs assumed related to the effectiveness of the actions of local leaders and institutions	

APPENDIX 2: Cut-offs and Weights Used for Each Characteristic in Ethiopia Somali Region Agro-Pastoral Impact Evaluation

Dimension	Characteristic	Cut-off: A HH is non-deprived if...	Weight
Livelihood	<ul style="list-style-type: none"> • Household wealth status 	It owns ≥ 3 small assets Or ≥ 2 big assets Or 2 small assets + 1 big asset. ⁶	0.3/14
Viability (30%)	<ul style="list-style-type: none"> • Household food security 	It reports having had to cut the size of meals, eat fewer meals, or reduce food consumed by adults in household ≥ 3 times in past week and reports not incidence of having to borrow food, going to sleep hungry, or going through a whole day with no food.	0.3/14
	<ul style="list-style-type: none"> • Household dietary diversity 	It consumed in the past 7 days a carbohydrate source ≥ 7 times; a protein source ≥ 3 times; and any vegetable source ≥ 3 times.	0.3/14
	<ul style="list-style-type: none"> • Livelihood diversification 	It engages in ≥ 2 livelihood activities with $\geq 50\%$ dependency on activities assumed to be significantly drought tolerant.	0.3/14
	<ul style="list-style-type: none"> • Gender risk differential 	The livelihood activities of men and women in HH are at equal risk to drought.	0.3/14
	<ul style="list-style-type: none"> • Crop portfolio 	It cultivated ≥ 3 crop types, including at least one drought-resistant crop.	0.3/14
	<ul style="list-style-type: none"> • Livestock portfolio 	It is dependent on at least 3 types of animals, including some shoats or camels	0.3/14
	<ul style="list-style-type: none"> • Livestock herd size 	It owns at least 5 large animals (cattle or herd camels) or 40 shoats	0.3/14
	<ul style="list-style-type: none"> • Ownership of pack animal 	It owns at least 1 pack camel or donkey	0.3/14
	<ul style="list-style-type: none"> • Livestock lost to disease 	No large livestock (camel, bull, cow, donkey) AND < 3 medium livestock (goats, sheep, pig) AND < 6 poultry birds	0.3/14
	<ul style="list-style-type: none"> • Livestock lost to drought 	No large livestock (camel, bull, cow, donkey) AND < 3 medium livestock (goats, sheep, pig) AND < 6 poultry birds	0.3/14
	<ul style="list-style-type: none"> • Livestock vaccination 	At least two-thirds of the livestock types owned by the HH are vaccinated (for livestock type to be considered vaccinated, at least 75% should be).	0.3/14
	<ul style="list-style-type: none"> • Access to drought warning information 	It reported having had received such information from community leaders, committee, government, or radio during drought of 2011.	0.3/14
<ul style="list-style-type: none"> • Drought preparedness practice 	Housed did at least any two of the following “good” practices during 2011 drought: Migrated with animals; destocked livestock; split herds; purchased feed or water to store; or gave some animals to others to care for.	0.3/14	
Innovation Potential (20%)	<ul style="list-style-type: none"> • Attitudes towards new livelihood practices 	Respondent either does not agree at all or agrees only to a small extent with 5 out of the 6 negatively phrased statements (Likert scale).	0.2/6
	<ul style="list-style-type: none"> • Awareness of climate change 	Respondent either does not agree at all or agrees only to a small extent with 5 out of the 6 negatively phrased statements (Likert scale).	0.2/6
	<ul style="list-style-type: none"> • Innovation practice 	Respondent reports having tried out or experimented with at least two new things over the past 2 years other than what the project is promoting. ⁷	0.2/6

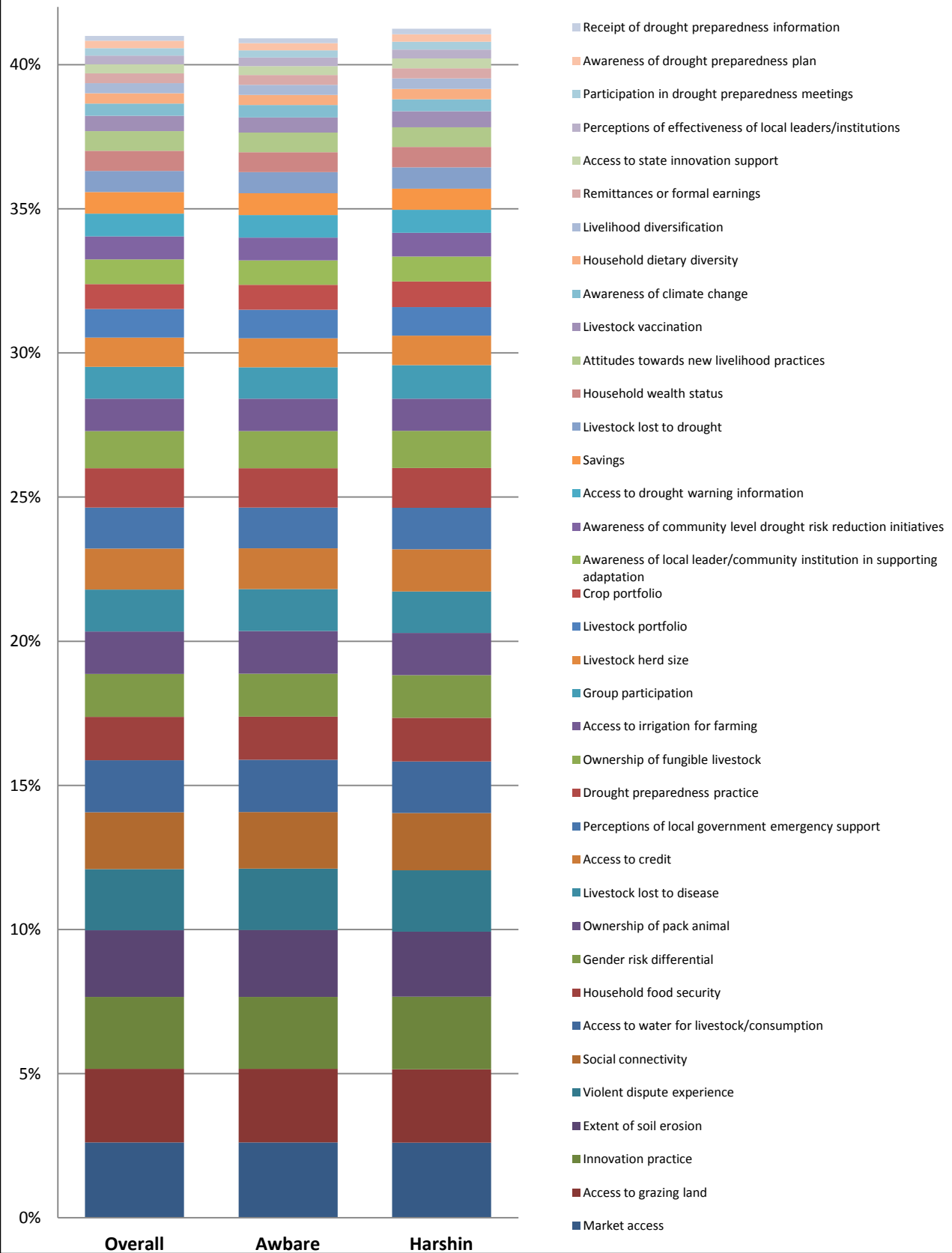
⁶ One recognised way of measuring a household’s wealth status is by examining the assets it owns. The “small assets” considered here include: plough, wheel barrow, mattress, mobile phone, radio, solar panel, TV, cart, or iron, while “big assets” included birkat, generator, vehicle, and mill. Data were collected on a much larger number of assets and other household wealth indicators. However, these were selected to define the binary wealth status indicator because these assets are assumed to reasonably differentiate exceptionally poorer household from those that are better off. The binary wealth status indicator is also significantly correlated with a wealth index developed from a much larger group of assets and other household wealth indicators using principal component analysis (t -statistic = 22.73; $R^2 = 0.4256$).

⁷ The list of innovative practices included doing any of the following for the first time: selling livestock in different markets; migrating livestock to a new area; renting grazing land; purchasing of feed for storage; harvesting of water; conserving feed for dry period; cultivation of new crop; tilled or ploughed soil in new way; purchased new type of seed; or started a new business. “Other” was also an option, and if something was mentioned, it was assumed to represent an innovative practice.

	<ul style="list-style-type: none"> • Access to credit 	Respondent reports that household took out loan in last 2 years Or could borrow at least 2,000 birr in the event it was needed from a money lender, non-local family members, savings group, or bank/credit institution.	0.2/6
	<ul style="list-style-type: none"> • Access to state innovation support 	Respondent reports having had accessed state extension support in new techniques in the last two years and reports at least finding the support moderately helpful	0.2/6
	<ul style="list-style-type: none"> • Market access 	Respondent does not report any "severe problems" with respect to access livestock pricing information, experiencing barriers accessing markets, and selling livestock at the going market rate; they may however report experiencing small problems to two out of the three issues and still be considered as non-deprived.	0.2/6
Access to Contingency Resources and Support (20%)	<ul style="list-style-type: none"> • Group participation 	Respondent reports being an active participant in at least 2 groups with medium involvement in decision making in at least one.	0.2/6
	<ul style="list-style-type: none"> • Social connectivity 	Respondent agrees at least to a medium extent with 5 out of the 6 positively phrased statements.	0.2/6
	<ul style="list-style-type: none"> • Perceptions of local government emergency support 	Respondent agrees at least to a medium extent with 5 out of the 6 positively phrased statements.	0.2/6
	<ul style="list-style-type: none"> • Savings 	Respondent states that there is enough savings to enable them to survive for at least 14 days in the event of a drought.	0.2/6
	<ul style="list-style-type: none"> • Remittances or formal earnings 	It reports have receipt of transfer money from outside community and/or someone in the home has a formal job	0.2/6
	<ul style="list-style-type: none"> • Ownership of fungible livestock 	It owns at least 20 shoats or 20 poultry birds.	0.2/6
Integrity of the Natural and Built Environment (15%)	<ul style="list-style-type: none"> • Extent of soil erosion 	It does not report experiencing severe erosion.	0.15/4
	<ul style="list-style-type: none"> • Access to irrigation for farming 	It reports having access to irrigation facilities or experienced only of small portion of its crops being lost during the 2011 drought.	0.15/4
	<ul style="list-style-type: none"> • Access to water for livestock/consumption 	It did not report experiencing serious difficulties accessing water for domestic or livestock using during the dry season of 2011.	0.15/4
	<ul style="list-style-type: none"> • Access to grazing land 	It reported only experiencing small problems or no problems accessing suitable grazing lands during the last dry season.	0.15/4
Social & Institutional Capability (15%)	<ul style="list-style-type: none"> • Awareness of drought preparedness plan 	It is at least partly aware of the contents of the plan.	0.15/7
	<ul style="list-style-type: none"> • Participation in drought prepare. meetings 	It has participated >= 2 times in past 12 months	0.15/7
	<ul style="list-style-type: none"> • Receipt of drought preparedness info. 	It had received such information >= 2 times in past 12 months	0.15/7
	<ul style="list-style-type: none"> • Awareness of community level drought risk reduction initiatives 	It is aware of at least 2 community level initiatives taken place in past 2 years	0.15/7
	<ul style="list-style-type: none"> • Violent dispute experience 	It does not report being involved in any violent disputes in past 2 years	0.15/7
	<ul style="list-style-type: none"> • Awareness of local leader/community institution action on adaptation 	It is at least partly aware that community leaders/institutions are doing something on the adaptation front.	0.15/7
	<ul style="list-style-type: none"> • Perceptions of effectiveness of local leaders/institutions 	Respondent agrees at least to a medium extent with 5 out of the 6 positively phrased statements.	0.15/7

APPENDIX 3:

Percentage of Weighted Characteristics Surveyed Households in Ethiopia's Somali Region are Non-deprived In with Absolute Contribution of Each Characteristic (in ascending order from most deprived to least deprived for overall dataset)



APPENDIX 4: Covariates Used in Analysis of Ethiopia Somali Region Dataset

1. Distance to community centre (minutes)
2. Distance to livestock market (hour)
3. Respondent is head of household
4. Respondent is female
5. Household size
6. Number of adults in household
7. Adults are all elderly in household
8. Household has only one adult
9. Household is female headed
10. Senior woman in household is first wife
11. Age of head of household
12. Household ethnic Somali
13. Head has at least some primary education
14. Number of adults with primary education
15. Head has at least some secondary education
16. Number of adults with secondary education
17. Head of Household is literate
18. Head of Household is productive
19. Number of productive adults in household
20. Household grew crops at baseline
21. Land area use for crops at baseline
22. Number of crops grown at baseline
23. Household did agricultural labour at baseline
24. Household did dry season labour at baseline
25. Household provided service at baseline
26. Household ran off-farm IGA at baseline
27. Household did formal work at baseline
28. Household received remittances at baseline
29. Household wealth index at baseline (derived via principal component analysis; Cronbach's alpha = 0.8001)
30. Estimated percentage of income from livestock at baseline
31. Estimated percentage of income from farming at baseline
32. Estimated percentage of income from labour at baseline
33. Estimated percentage of income from dry season at baseline
34. Estimated percentage of income from service at baseline
35. Estimated percentage of income from IGA at baseline
36. Estimated percentage of income from formal work at baseline
37. Estimated percentage of income from community at baseline
38. Estimated percentage of income from remittances at baseline
39. Estimated percentage of income from aid at baseline