

Changes in the drylands of eastern Africa: technical note on the evidence synthesis and data mapping

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The Purpose of this Technical Note

This Technical Note and associated Excel data catalogues represent one part of a larger piece of research funded by DFID and conducted by a team lead by IDS over the period 2015-2016. The research had three main objectives: 1) to synthesise all relevant literature on poverty, vulnerability, livelihoods and change in the arid and semi-arid lands (or 'dry-lands') of East Africa, 2) to map national and sub-national datasets on poverty, vulnerability, livelihoods and resilience drawing on the work of others, and 3) to identify priority, long-term evidence gaps, and make recommendations on research and data collection approaches and methodologies by drawing on existing literature.

This research was commissioned by DFID because until now, very few research studies have taken a holistic look at livelihoods and resilience in the drylands of eastern Africa. By reviewing evidence and data from across this geographic patchwork of countries, a framework has been developed that has the potential to pull together evidence from various disciplines and considerably enhance understanding of the dynamic pathways of change in East Africa.

The focus countries included in the review are South Sudan, Ethiopia, Somalia, Kenya and Uganda. Our research focuses on five specific pastoralist systems:

- **The Maasai** system in Kenya's South Rift Valley
- **The Somali** region of Ethiopia
- **The Borana** Plateau, Southern Ethiopia
- **Karamojong** Uganda
- **Northern Bahr el Ghazal** region in the greater Bahr el Ghazal livelihood zone of South Sudan

Country Evidence Specialists identified and interviewed key informants with expertise in pastoralist systems¹ in Ethiopia, South Sudan and Uganda. The evidence and data that they gathered were central to compiling the essential 'grey literature' required for evidence synthesis and evaluating the quality of datasets in a data mapping of the pastoralist systems. More than 400 documents were retrieved and reviewed to inform the literature synthesis and we mapped more than 100 datasets according to their research details and survey data collection. This note describes the methods used to create two associated data catalogues, along with some analysis of our findings and recommendations for future evidence and data collection processes in the drylands.

¹ See Annex B for a list of those interviewed by the CESs in country.

Acronyms

ALNAP - The Active Learning Network for Accountability and Performance in Humanitarian Action

ASAL – Arid and Semi-Arid Lands

CGIAR – Consortium of International Agricultural Research Centers

DFID – Department for International Development

DHS – Demographic household survey

EAs – Enumerator areas

HCE – Household Consumption Expenditure Survey

HELP - Humanitarian Evaluation and Learning Portal

IBLI – Index-Based Livestock Insurance

IGAD – Intergovernmental Authority on Development

ICA – Integrated Context Analysis

IDS – Institute of Development Studies

ILRI – International Livestock Research Institute

MDG – Millennium Development Goals

NDVI – Normalized Difference Vegetation Index

NDMA – National Drought Management Authority

NGO – Non-governmental organisation

PARIMA – Pastoral Risk Management in Southern Ethiopia

PRIME – Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion Project

REGLAP – Regional Learning and Advocacy Programme

DLCI – Drylands Learning and Capacity Building Initiative for Improved Policy and Practice in the Horn of Africa

SDGs – Sustainable Development Goals

TC – Technical Consortium for Building Resilience in the Horn of Africa

TLU – Tropical livestock unit

USAID – United States Agency for International Development

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Table 6: Type of method used to collect the data

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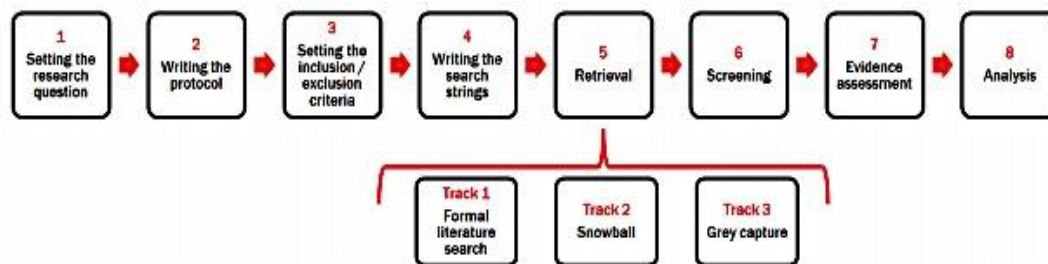
Evidence Synthesis

Evidence review methodology

Over the course of the research evidence was gathered from more than 450 documents that explore and analyse different aspects of livelihood transformation in the arid and semi-arid regions of Ethiopia, Kenya, Uganda, Somalia and South Sudan.

Documents were retrieved by formal literature search, using a number of databases alongside a manual process of ‘back-searching’ and the use of ‘snowballing’ techniques to identify additional literature. A limited number of key informant interviews were also carried out with experts in a variety of pastoralist systems and themes. These interviews were critical to uncovering ‘grey literature’ that is often hidden in formal searches. The process of literature review is shown in Figure 1 below. When screening the criteria for *robustness*, research methods were guided by articles that were i) published in academic journals, ii) cited within published articles or recommended by country evidence specialists or interviewees, and iii) published policy documents. Grey and academic literature from 2000-present were included within the review (excluding those with an advocacy focus), with priority given to the most recent documents.

Figure 1. Stages in a rigorous, evidence-focused literature review



Source: Hagen-Zanker and Mallet (2013)

The limitations of the study were primarily related to not being able to identify all of the evidence related to specific geographic areas across the wide spread of thematic issues within the study. Evidence was more readily available for Ethiopia and Kenya than Uganda and Somalia; so these regions appear to be over-represented in the study. Substantially more research effort was focused on South Sudan so as to ensure balance in the overall review – with retrieval processes, search strings and snowball research being used predominantly in South Sudan.

Each piece of research evidence was categorized according to its primary theme², the nature of analysis, and the relevant country’s pastoralist system³ (Table 1). The evidence was coded by its primary theme and findings in a spreadsheet, which is submitted with this report.

² In the relatively rare event of a piece of research fitting several themes, it was referenced multiple times, with the overall figure for each theme comprising a slightly higher number than the total documents reviewed.

³ Pieces of research that covered more than one system were also categorised in multiple entries, with an increase in the total figure.

Table 1: Categorising the literature

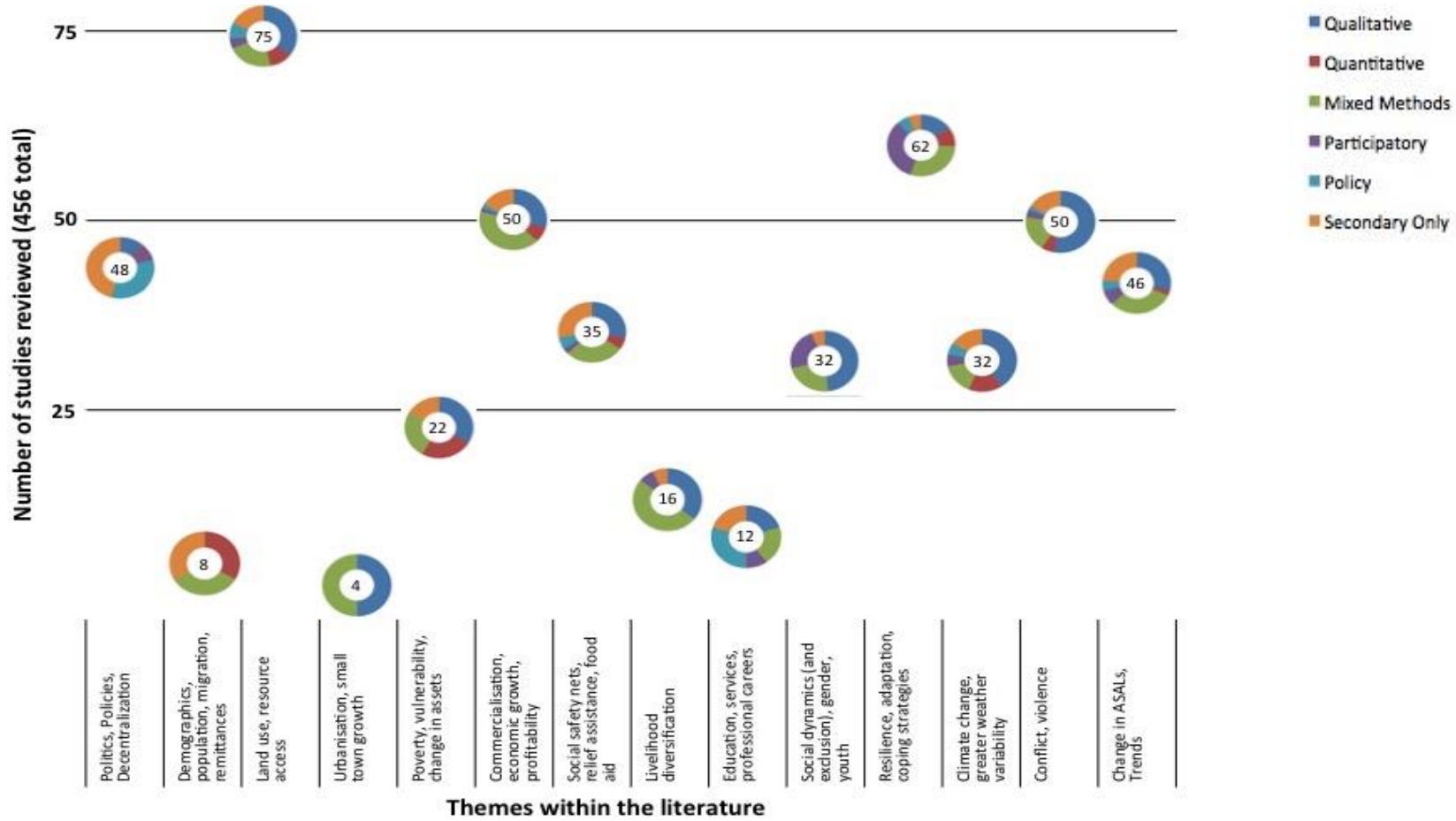
Literature considered in the review (470 total documents) by country, theme, nature of analysis and pastoralist system covered
<p>Literature more dominant in Ethiopia and Kenya:</p> <ul style="list-style-type: none">• Ethiopia (156)• Kenya (143)• Uganda (64)• South Sudan (36)• Somalia, Puntland and Somaliland (56)
<p>Under-represented themes/gaps in the literature:</p> <ul style="list-style-type: none">• Demographics, population growth, shifting population trends, migration (open and closed remittances) (8)• Land use, resource access (75)• Urbanisation, small town growth (4)• Poverty, vulnerability, change in assets (22)• Livestock commercialisation, economic growth, profitability (50)• Social safety nets, relief assistance, food aid (35)• Livelihood diversification (16)• Education, services, professional careers (12)• Social dynamics (and exclusion), gender, youth (32)• Resilience, adaptation, coping strategies (62)• Climate change, greater weather variability, environmental pressures (32)• Conflict, violence (50)• Change/trends (46)
<p>Literature by nature of analysis:</p> <ul style="list-style-type: none">• Quantitative (survey only/economic) (33)• Qualitative (135)• Participatory (41)• Mixed methods (survey and other field work) (112)• Policy (36)• Secondary sources only (100)
<p>Literature covering pastoralist systems:</p> <ul style="list-style-type: none">• Borana (88)• Karamoja Uganda (61)• Karamoja Cluster (Eastern Equatoria) (26)• Karamoja Cluster (Turkana) (49)• Maasai South Rift (62)• Northern Bahr el Ghazal (22)• Somali Region (86)

Evidence review findings

The evidence synthesis found that the most of the literature concentrated on land use and resource access, resilience, livestock commercialisation, conflict, politics and decentralisation, and trends of change (Figure 2). There was less of a focus on urbanisation and demographic change, as well as on themes of education and essential services, livelihood diversification, poverty, social dynamics (including youth and gender), climate change, and social safety nets and relief.

Most of the literature was informed by qualitative and mixed-method approaches. Participatory research methods featured less and were the least utilised in the literature review, even though they are better represented in thematic studies including social dynamics, conflict and resilience.

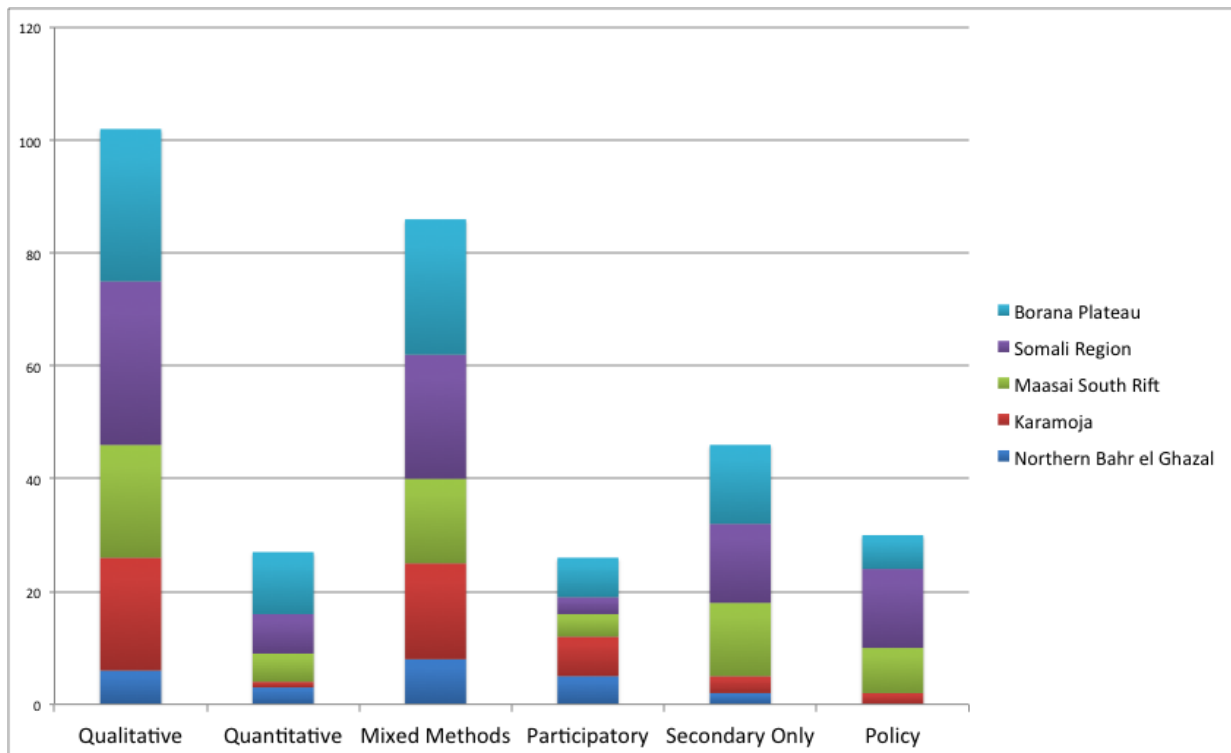
Figure 2: Dominant themes emerging from evidence/literature review



The mixed methods approach was highly utilised in all of the research and included a quantitative survey component utilised in combination with at least one qualitative research method. Literature based on purely quantitative, econometric work was sparse, most likely due to the cost and long-term commitment required for these methods. Compared to other systems, literature related to Karamoja was informed mainly by participatory methods.⁴

Figure 3 (below) provides a visual representation of the nature of analysis that informed the documents in each system.

Figure 3: Type of method informing literature, by pastoralist system



Source: Evidence Synthesis Annex 2.

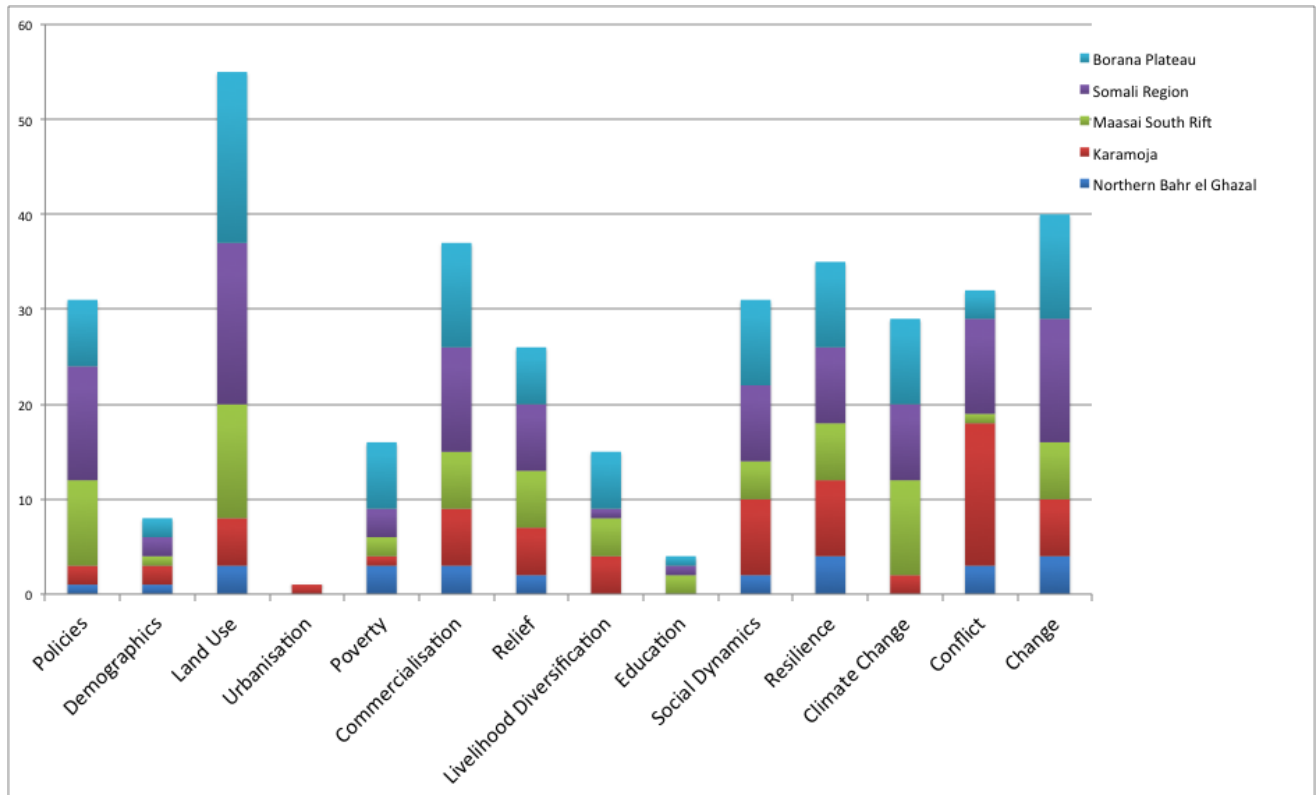
Figure 4 (below) indicates that the majority of evidence reviewed relates to land use, particularly in the Ethiopian systems. Land use was also highly researched in Maasai South Rift, Kenya. System change was the next most-research theme, with roughly equal relative representation across the systems.

In Karamoja, a greater number of documents focused primarily on conflict as compared to the other themes. This is of particular interest because the literature also demonstrated a decrease in violence in recent years; with conflict impacting livelihoods less than it had over the past two decades, due to a relatively peaceful period in Uganda. Compared to the other locations, Karamoja also featured more of a focus on social dynamics. Other areas of note include the prominence of

⁴ It should be noted that participatory methods were coded when they were expressly discussed in the methodology. Participant observation, key informant interviews, and focus group discussions were coded under qualitative methods.

commercialisation and resilience as overall themes. Climate change is a dominant theme in the Maasai South Rift and is not represented in Northern Bahr el Ghazal, South Sudan.⁵

Figure 4: Themes emerging from evidence/literature review, by pastoralist system



Source: Evidence Synthesis Annex 2.

The primary methodology for the evidence review was to code each study by its primary theme, upon which its findings are based. Some studies cover multiple systems and are focused on the same theme. These are therefore included in this graphic in more than one system. A very small number of studies included two primary themes upon which they reported findings. Such studies are represented in this chart within both themes. Therefore, there is a slight variation between this graph, and Figure 2, which counts across themes but not systems.

⁵ It should be noted that there was considerably less literature on South Sudan and therefore the existence of one or two studies on a topic easily skewed the thematic representation.

Data Mapping

Data mapping methodology

In order to map national and sub-national datasets on poverty and vulnerability in the drylands of East Africa, a data mapping methodology was developed that built upon previous mapping and analysis of the quality data collection in the region.⁶

At a 'meta-level' this involved:

- Reviewing recent literature on data limitations in the East African drylands.
- Working with ILRI and Habitat Info to understand the datasets that are included in their 2014 previous mapping of ASAL indicators.

A unique data catalogue (see associated EXCEL data catalogue) was also developed by i) seeking out datasets from large studies of programmes designed for dryland areas, ii) relying on insights from Country Evidence Specialists, iii) using a snowball approach to find data experts in the region, and iv) incorporating datasets that were part of key research discovered via the literature synthesis. Also included were:

- Baseline studies and other evaluation datasets⁷.
- A focus on data primarily available since 2000, featuring long running data sets, and also including major data sets from as far back as 1981 so as to indicate trends over a longer period time.
- A study of datasets related to pastoralist systems that informed case studies in this report in order to ground the research.⁸

More than 100 datasets were mapped according to data method and survey characteristics, with categories including: Country; Pastoral System; Organisation Hosting Data; Organisation Collecting Data; Open Access; Data type: Qualitative, Quantitative, Mixed Method, Participatory; Panel or Cross-Section; Date and Frequency of Data Collection; Development, Humanitarian, Both; Impact Evaluation; Sample Size; Smallest Unit Of Sample (Household/Individual/Area); Representative Level; Type Of Analysis Performed; Ethnic Population/Pastoral or Agropastoral Group Coverage; Sufficiently Designed for mobile pastoralists; Whether the dataset has been used in published work (as a proxy for data quality).

Using data reports or, where possible, the survey questionnaire themselves, a range of indicators were identified and catalogued related to: Household size and demographics; Female headed households; Poverty; Income, cash income and income sources; Access to Credit; Milk production, consumption and sales; Nutrition; Dietary diversity; Health; Livestock: herd size, breeding/slaughter stock, herd death and birth rates, sale and purchase; Land ownership; Land use; Access to grazing; Irrigated land use; Crop production; Proximity to market; Migration; Remittances; Food aid; Social

⁶ This is not a review of key statistics for the region. For such a comprehensive review, see Tilstone et al 2012.

⁷ USAID recently made a significant investment in baseline studies, which will be revisited in five years, allowing for further trend analysis.

⁸ For national datasets said to be representative of drylands regions, we investigated coverage and, where possible, reviewed the survey questionnaires.

transfers; Education; Women's Empowerment; Social Tension; Weather variability; Climate change; Productive assets; Shocks and shock type; Coping strategies; Conflict; Violence; Resilience Indicators.

The major challenge in accurate mapping of existing data was the lack of transparent and public information about the data was gathered. In addition, some of the most cited information is taken from publications derived from established monitoring and early warning information systems. These publications do not typically include the raw data or even comment on the data collection process. The data mapping process was therefore limited by the availability of robust country-based knowledge, all be it augmented through information provided by Country Evidence Specialists. It was not possible to access all of the household survey questionnaires that were used for datasets, which compromised information related to specific indicators, but the review did draw on partial information from survey reports to enhance the data. Future mapping processes could be improved by including more datasets and more complete information on those datasets, specifically indicators, as identified. However, this process has been useful in highlighting gaps, limitations and opportunities to understand changes to people's livelihoods over time in pastoralist regions and systems.

Data mapping findings

This research sets out to map (or catalogue) national and sub-national datasets on poverty, vulnerability, livelihoods and resilience in the dryland regions of East Africa, drawing on the work of others in order to understand changing trends and impacts on poverty, vulnerability and resilience. This section considers the outputs of the data mapping; summarizes findings from available literature related to this data; and also provides an analysis of the data catalogue itself, presented as an accompanying excel document to this report. It focuses initially on literature related to the gaps and limitations of the data, and then highlights the findings of data mapping that was delivered in the light of these issues. Finally, recommendations are made for use of data and future work.

Review of literature on data in the dryland regions of East Africa

Data is currently in high demand – it is expected to be at the centre of measuring progress against the Sustainable Development Goals and is increasingly being used by development actors and governments to evaluate development and humanitarian programme investments towards intermediate goals including resilience as well as outcome goals in the form of standard development indicators (Randall 2015; Downie et al., 2014).⁹ Unfortunately, while data is in high demand, it has not historically been robustly gathered in the dryland regions. Moreover, in arid and semi-arid contexts, data must be interpreted through knowledge of the particular dryland context in order to understand the drivers of vulnerability and resilience (Tilstone et al., 2013: 4).

Growing discussion of the inclusion and undercounting of pastoralists in censuses and standard surveys across the region is also evidenced in the literature (Oxfam 2010; Tilstone et al., 2013; Kratli and Swift 2014; Randall 2015). A thorough analysis of emerging literature highlighted problems in identifying and counting pastoralists in each of the countries under review, resulting in unreliable population estimates in data about dryland regions. Furthermore, these problems lead to challenges in measuring change in pastoralist systems and pastoralist livelihoods over time.

⁹ <http://www.slideshare.net/ILRI/resilience-may2014-downie> video of the presentation here:
<https://www.youtube.com/watch?v=l--XgRB7iJ4&list=PLeqdWbb3KnJ9AOZyD8MJpFPJH3mLP63Uy&index=2>

Problems in defining and counting pastoralists

Kratli and Swift 2014 detail the challenges inherent in defining and counting pastoralists, particularly ‘mobile pastoralists’ (Randall 2015:2), which leads to the gathering of unreliable demographic data in pastoral production systems and areas. In Ethiopia, the 2007 census was the first to cover the Afar and Somali regions (Table 2), but excluded some administrative districts for reasons of insecurity (Randall 2015). In the Kenya census series dating back to 1969, data is classified by ethnicity such as Maasai, Turkana etc. (Table 2), but it is not possible to identify mobile pastoralists (Randall 2015) or obtain data on pastoral systems (Kratli and Swift 2014). The Kenya 2009 census only references pastoralist activities in one section of its questionnaire limited to individuals who ‘worked on own agricultural holding’ (KNBS 2009 in Kratli and Swift 2014). Uganda’s Population and Housing Census (2002) includes questions about livestock so it may be possible to identify numbers of people who rely on livestock-based livelihoods but the overall figure may not be representative of Karamoja; the 2002 census also did not include polygamous or split households and had few samples from Karamoja, most of which were collected near main roads (Table 2). It is not yet clear whether these issues will remain in the 2014 census. In the Sudan Population and Housing Census 2008, the questionnaire includes ‘animal husbandry’ as a main livelihood strategy and sampling was done for nomadic households; prior censuses excluded the South (Table 2). Somalia’s 2014 Population Estimation Survey methodology was specifically developed for pastoral livelihoods and systems but while census methodologies and coverage are improving there remain long-term reliability issues with data gathered before 2005 (Table 2).

The Kenya 2009 census, while not able to provide information on mobile pastoral populations, does classify information by pastoral ethnic group and was the first to include data on livestock ownership. The Ethiopia 2007 census was more universal in its coverage than previous censuses that entirely excluded Somali and Afar regions. The much-anticipated Uganda 2014 census is not yet known. South Sudan’s 2008 census and Somalia’s 2014 population estimate both show promise for covering pastoral regions and gathering information pertinent to pastoral livelihood systems. Therefore the demographics data in the arid and semi-arid regions is not well established but has been improving.

Geographic coverage is also an issue. For example, the census in Ethiopia excludes administrative areas with the highest mobility pastoralists. Those areas that are easiest to reach are also more likely to host pastoral populations that are close to settlements, those that are around substantial water sources, and those who are less mobile; mobile pastoralists with large herds who travel long distance are likely to have different socio-economic characteristics (Randall 2015).

Table 2: National censuses relevant for populations of dryland areas

The following questions were used as criteria to check the robustness of the censuses featured in the literature review:

- Did enumerators visit dryland areas in relevant geographic locations?
- Did the enumeration strategy specifically target mobile households?
- Did the survey ask questions about lifestyle/mobility?
- Did the survey ask people about affiliation to a pastoral group/ethnicity?
- Did the survey ask about livestock rearing as an income source or livelihood strategy? Is the dataset contested?

Kenya Population and Housing Census	✓	Data has been collected in 5 censuses taken every 10 years since 1969 with data collected and classified by ethnicity, meaning that it is possible to understand the evolution of numbers of different pastoral groups (Turkana, Maasai, Somali, Gabbra, etc.) (Randall 2015)
	X	Numbers are not disaggregated by lifestyle or mobility; thus numbers of mobile pastoralists cannot be separated out. There is some concern that the population estimate in the 2009 census included cross-border populations because it was used as a basis for developing electoral constituencies, therefore incentivising high population rates. The 2009 census was the first to include livestock. (Randall 2015)
	✓	Questions on livestock ownership asked for the first time in 2009 (Randall 2015). Data on livestock holdings was limited by aggregation by district; and a finer analysis started in 2014 (Kratli and Swift 2014).
Sudan Population and Housing Census 2008	X	Relatively good quality data was collected, but the dataset was contested by the Government of Southern Sudan, but it is being used for planning and budget allocation purposes.
	✓	Long form questionnaire for sedentary households (selected enumeration areas) and a sample of nomad households. Dryland areas were included in the census.
	✓	Previous residence of origin (according to nine 1956 provinces) question was included; ethnicity and religion questions were not asked.
	✓	Questionnaire allows enumerators to identify subsistence animal husbandry as a main livelihood activity and asks about household affiliation to pastoral group.
Uganda Population and Housing Census	✓	Livestock related questions are asked.
	X	Figures in Karamoja may not be representative; the 2002 census did not define households in polygamous/split household settings and had small samples in Karamoja, mostly collected near main roads.
Population and Housing Census in Ethiopia 2007	✓	2007 census was the first to be universal, with the exception of some highly mobile pastoralist administrative districts in Somali region; survey questionnaire asks about type of residence and includes 'pastoralists'.
Somalia Population Estimation Survey 2014	✓	Yes - Methodology was developed to capture nomadic populations; water points were used to identify purely nomadic pastoralist populations.
Adapted from: Kratli and Swift 2014, Randall 2015, <i>Population Estimation Survey 2014 For the 18 Pre-war Regions of Somalia</i> , and Authors' own research.		

Political challenges to counting pastoralists

Another limitation in the use of the census data is that it was gathered for governance purposes, to define constituencies and ascertain requirements for entitlements and funding for social services. This can create incentives to inflate population numbers, rendering the data unreliable. In areas where pastoralists cross borders that have historically been neglected by government services or conversely, where they prefer autonomy, there are complicated incentives at play. For example, there is some concern that population estimates from the 2009 census in Kenya included cross-border populations because the census was the basis for developing electoral constituencies thereby incentivising high population rates (Jubat 2011, Mayoyo 2011, Oparanya 2010, in: Randall 2015).

According to Randall, due to the limitations of the data before 2010:

We will never know the absolute numbers of mobile pastoralists for the half century between independence in the early 1960s and 2010 which was probably the time when there was greatest proportional drop-out from this way of life as a result of a combination of a number of interrelated factors: climatic (dry after the relatively wet years of the 1940s and 1950s), political (pressures of sedentarisation, political control of those seen as uncontrolled and at the margins) and socio-economic (pressure from government, NGOs and international development organisations). However, the critical factor now is no longer the population history, although that would have been useful, but whether these populations are doomed to remain invisible in the next phase of the development story: that of the Sustainable Development Goals and the data revolution (pp. 14).

Problems in collecting reliable population information from the data

Beyond population figures, there are also limitations in the use of demographic data related to survey design and methodology, as well as interpretation according to dryland contexts (Tilstone et al., 2014; Randall 2015). Because the census data is the basis for the enumeration of Demographic and Health Surveys and other national household datasets, their sampling also reflects flaws in data collection, often excluding pastoralist areas prior to 2005 (Table 3). Tilstone et al find that problems also arise when utilising standard indicators and survey methodologies that were developed for sedentary populations because they: a) do not adequately measure households in their complexity within pastoral and agro-pastoral livelihood systems, b) do not give assets and resources, most notably animals, proper weight in indicators and indices, c) may draw conclusions based on non-dryland contexts, for example interpreting a poverty indicator based on data on type of housing structure, and d) indicators and results related to livestock that can be interpreted incorrectly if the dynamism of fluctuating herd size in the livelihood is not taken into account (2014).

Kenya 2008-09 DHS	✓	Survey of whole country including arid and semi-arid areas. Fewer households interviewed in NE province because of difficulties in travelling and interviewing in sparsely populated and largely nomadic population. The first DHS to cover the entire country including northern districts excluded from previous surveys was in 2003.
Kenya 2005/06 Integrated	✓	Pastoral districts and a livestock module were included in the survey in 2005/06.
	X	Although a module was included to collect data on livestock in 2005/06 it was not

Household Budget Survey		possible to provide national estimates. No livestock census had been carried out prior to 2005/06 survey so livestock weights were not developed. No mention of mobility or pastoralism in methodology.
Sudan 1989 DHS	X	Excluded South Sudan because of insecurity and excluded the nomadic population of North Sudan
South Sudan 2009 National Baseline Household Survey	X	Enumerator areas (EAs) were based on 2008 census. The 2009 survey produced relatively good quality data and the dataset was not contested. There were questions about subsistence and livestock rearing as a livelihood activity. Dryland areas were covered but there was no information from nomads, camps and other special types of households.
Uganda 2011 DHS	✓	Covered whole country. Karamoja had the lowest proportion of completed selected rural households.
Ethiopia 2011 DHS	X	In the Somalia region, in 18 out of 65 selected EAs, households were not interviewed for reasons, such as drought and security problems; and 10 of the 65 selected EAs were not listed due to issues of security. Data for Somalia may therefore not represent the region as a whole. However, national-level estimates were not affected, as the percentage of the population in the EAs not covered in the Somali region is disproportionately very small.
	X	Due to security concerns in the Somali region, it was decided that the 2011 DHS would be conducted only in 3 of 9 zones in the Somali region: Shinile, Jijiga and Liben, same as in the 2000 and 2005 DHS. However, a later decision was made to include 3 other zones: Afder, Gode and Warder.
	✓	Oversampling was required in Affar and Somali regions in order to have robust regional estimates.
Ethiopia 2010/11 Household Consumption Expenditure Survey	X	HCE survey excluded non-sedentary populations in Afar (three zones excluded) and Somali (six zones excluded).
	✓	Questionnaire asked about 'Basis of households livelihood – Livestock'.
Ethiopia 2010/11 Welfare Monitoring Survey	X	Included all rural and urban areas of the country except non-sedentary areas in Afar and Somali Regional States. Excluded are three zones of Afar and six zones of Somali Regions.
Somaliland 2012-2013	✓	Extensive livestock questions were asked.

Household Survey		
Source: DHS country reports www.dhsprogram.com/publications/ . In Randall 2015.		

Unreliable livestock data

Lastly, data collection related to livelihoods generate from livestock in the focus countries is unreliable. The last livestock census in Sudan took place more than thirty years ago (Behnke and Osman 2012). The Annual Livestock Sample Survey in Ethiopia excludes the pastoral areas of three zones in Afar and six zones in the Somali region¹⁰. There are no reliable datasets on livestock in Karamoja, Uganda meaning that neither livestock nor demographic data are clear in the region¹¹; accessibility was so poor from the 1970s to the mid-2000s that even organisations present in the area were not able to gather representative data and relied instead only on data from areas around towns. In Somalia, there is likewise a shortage of quality data – a trend that may be reversing despite continued insecurity constraints with the innovation data work that has been adopted since 2010.

Improvements in data collection in pastoral areas would allow for improved understanding of changing trends over time, particularly regarding population figures, mobility and livestock. However, even given the current state and limitations of the existing data, by using a combination of other factors, it has been possible to enable an analysis of changing trends in livelihoods and vulnerability, particularly given the amount of qualitative, participatory and mixed methods studies.

Review of Baseline Datasets for the IGAD Member States

In 2011, the International Livestock Research Institute (ILRI), on behalf of the Technical Consortium for Building Resilience in the Horn of Africa (TC), a project of the Consortium of International Agricultural Research Centers (CGIAR), developed a baseline of datasets for the Intergovernmental Authority on Development (IGAD) member states. The project collected indicators across a wide range of ecological, social and economic themes¹². This baseline compiled 452 datasets and indicators within a catalogue (See excel data catalogue 1) and mapped them onto a GIS platform so that they can be viewed as maps. This baseline of datasets hosts national level datasets that represent dryland regions in East Africa based on DHS data, MDG indicator data, data based on observable characteristics (such as the NDVI) and datasets that combine observable characteristics with projections that may or not be suited to dryland contexts¹³, among others. Examples of data collected by the ILRI baseline include: MGD Indicator Datasets (underpinned by Living Standards Measurements Surveys/Household Budget Surveys), The Global Rural-Urban Mapping Project (estimates of human population whereby a proportional allocation gridding algorithm is used to assign population values to count grids that are divided by the land area to produce population densities), Demographic and Health Surveys, ILRI's own livestock data, and HarvestChoice (data on crops and products from historical national household surveys and agricultural census data).

The methodology and coverage issues outlined in the previous section are relevant to the interpretation of this data and limit its usefulness for trend analysis going backwards in time; however, interpreted correctly with an understanding of the limitations these datasets can provide an informed meta-level baseline for comparison moving forward.

¹⁰ For an approximation that accounts for this exclusion, see Behnke 2010.

¹¹ A Livestock Census in 2008 was contested for its Tropical Livestock Unit (TLU) standard.

¹² For a full description of the project, see Davies and Wroblewski 2013.

¹³ For a complete review, see Chesterman and Downie 2014.

It also provides contextual datasets that are essential to the measure of resilience at a systems level: Rainfall data, Vegetation data, Water resource data, Land degradation data, Forest loss data and others. These sources of data provide a background against which household data can be considered. According to Downie et al, for resilience measurement, household level living standards must be combined with data on system resilience (2014). See Box 1 for an example of how such data work is currently being undertaken using food security/poverty data and system-level data.¹⁴

The data mapping undertaken did not replicate this baseline. Instead it represents a comprehensive collection of national and meta-level data that is available for the dryland regions of East Africa. With careful interpretation, it provides a baseline resource against which future data can be compared.

Data Mapping Analysis

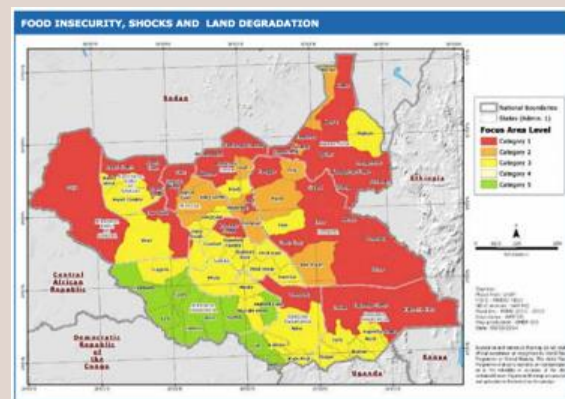
To build upon the ILRI baseline database, the data mapping focussed primarily on datasets collected at household and community levels and those that were specifically designed for the dryland areas (see excel data catalogue 2). These datasets provide information on poverty, vulnerability, livelihoods and resilience at various levels of representativeness: national, sub-national, and sometimes relatively local level. Long running and panel datasets with potential to be used for trend analysis were also identified to provide information on changing livelihood trajectories in particular areas and systems.

Box 1: The World Food Programme has developed an Integrated Context Analysis (ICA), which maps trend data from a number of technical and sectorial disciplines in order to provide an understanding of what has happened in the past as an indicator of what may occur in the future, and where short, medium, and longer-term programming efforts may be required.

Integrated Context Analysis combines data on:

- food security and nutrition;
- exposure and risk to shocks;
- environmental factors that can increase the severity or impacts of shocks;
- livelihood types; and
- additional information, such as security, prices, infrastructure, population density.

The trend maps show recurring food insecurity and under nutrition, shocks and other aggravating factors to better understand resilience (WFP 2014).



¹⁴ The Integrated Context Analysis (ICA) is part of a broader three-step process, the 'three-pronged approach', that strengthens the design, planning and implementation of longer-term resilience building programmes. It places people and partners at the centre of planning at three different levels. It involves: 1) At the National Level: the Integrated Context Analysis, 2) At the Sub-National Level: Seasonal Livelihoods Programming which is a consultative process to design an integrated, multi-year and multi-sectorial operational plan using seasonal and gender lenses, and 3) At the Local Level: Community Based Participatory Planning. WFP (2014) A WFP Approach to Operationalise Resilience: Part 1, Integrated Context Analysis. Available online: <http://documents.wfp.org/stellent/groups/public/documents/communications/wfp264472.pdf> (accessed Feb 25 2016)

Findings from analysis of the Data Catalogue

A thorough review of data sources according to criteria laid out in the inception report resulted in a final data catalogue that includes high quality information on 107 data sources. Ninety-four per cent (101) of the data sources have been used to inform published literature or are cited in other reports or publications. As shown in Table 4 (below), the majority of datasets included in the catalogue are from Ethiopia and Kenya, followed by Uganda and South Sudan. Only 10 data sources are identified for Somalia.

Table 4: Data sources by Country

Country	Number	Per cent
Ethiopia	29	27.1
Kenya	29	27.1
Kenya, Ethiopia, Somalia	1	0.93
Puntland	1	0.93
Puntland and Somaliland	1	0.93
Somalia	9	8.41
Somaliland	2	1.87
South Sudan	16	14.95
Sudan	1	0.93
Sudan, S. Sudan (CPA agreement)	1	0.93
Uganda	17	15.89
Total	107	100

When the data sources are categorised by pastoral system, it is clear that the South Sudan region is relatively under-represented (Table 5).

Table 5: Data sources by Pastoralist System¹⁵

Pastoral System Covered	Frequency	Per cent
Borana Plateau	11	10.27
Borana Plateau, Southern Ethiopia	1	0.93
Borana Plateau; Somali Region	7	6.54
Karamoja Cluster, Kenya	6	5.61
Karamoja Cluster, South Sudan	1	0.93
Karamojong	17	15.89
Maasai South Rift	8	7.48
Maasai South Rift; Karamoja Cluster, Kenya	9	8.43
Northern Bahr el Ghazal	1	0.93
Northern Bahr el Ghazal; Karamoja Cluster S. Sudan ¹⁶	7	6.54
Somali Region	8	7.48
N/A	31	28.97
Total	107	100

¹⁵ Karamoja Cluster Kenya refers to Turkana County. Karamoja Cluster South Sudan refers to Eastern Equatoria State.

¹⁶ Eastern Equatoria district.

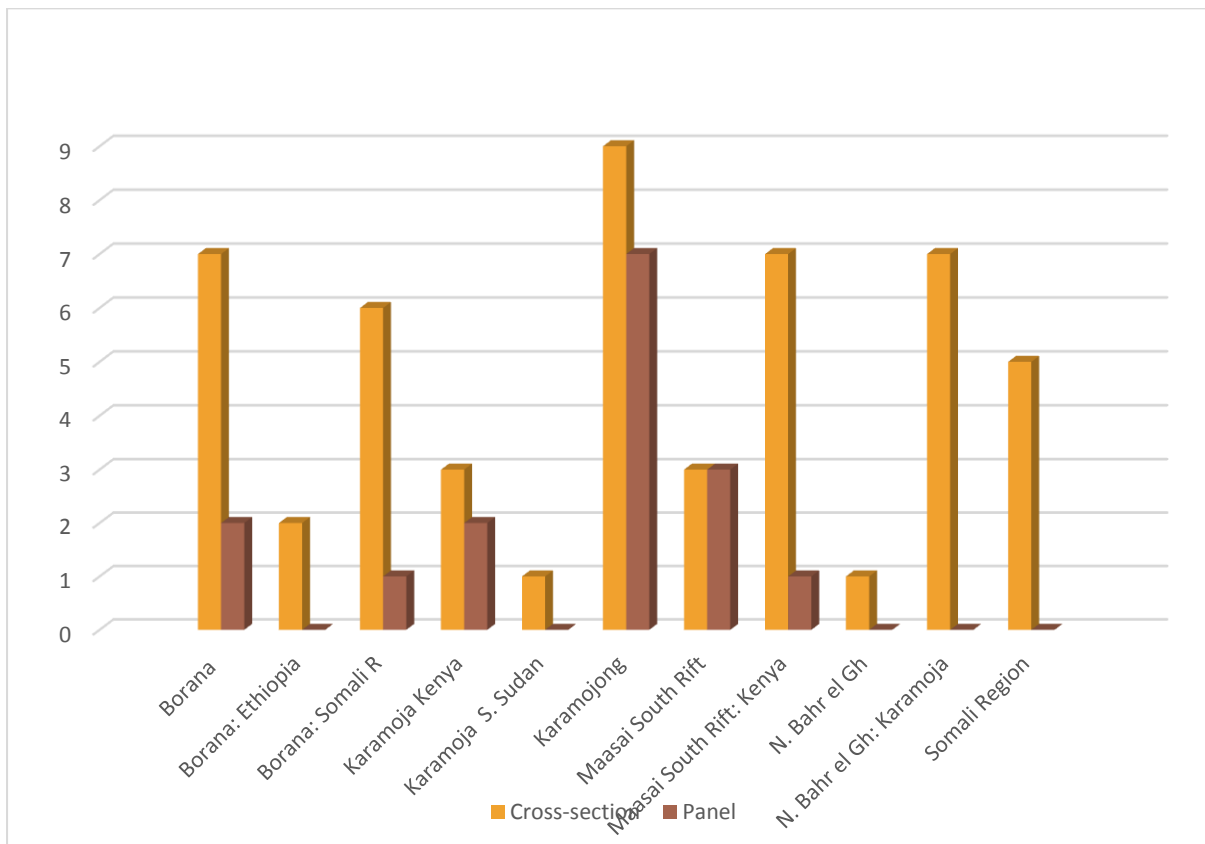
Table 6, below, shows that 51 per cent of datasets from dryland regions represent quantitative data collection, with a further 42 per cent involving mixed methods -- quantitative combined with qualitative.

Table 6: Type of method used to collect the data

Type of data collected		
Ecological/Anthropological	1	0.93
Mixed Method	42	39.25
Participatory	2	1.87
Quantitative	55	51.4
Unknown or N/A	7	6.55
Total	107	100

In terms of the nature of data collected, of the 107 data sources, 67 per cent were cross-section data collection exercises, 23 per cent utilised panel data and the rest (9 per cent) were unknown. The majority of panel data collection efforts focused on Karamojong, with 6 panel data sets and 9 cross-sectional data sets being collected (Figure 5). There was no panel data collection in South Sudan or the Somali region and a limited amount in the Borana cluster.

Figure 5: Type of data collected by pastoralist system



Of the 25 panel data sources identified, 13 comprised mixed methods, 11 were purely quantitative and one involved a participatory survey.¹⁷ Figure 6 draws on 75 cross-section and 25 panel data sets to indicate the frequency of data collection. Further, assessing the purpose of the data collection, 60 per cent were for development, compared to 10 per cent for humanitarian and 30 per cent for both (Figure 7).

Figure 6: Frequency of data collection by type of data

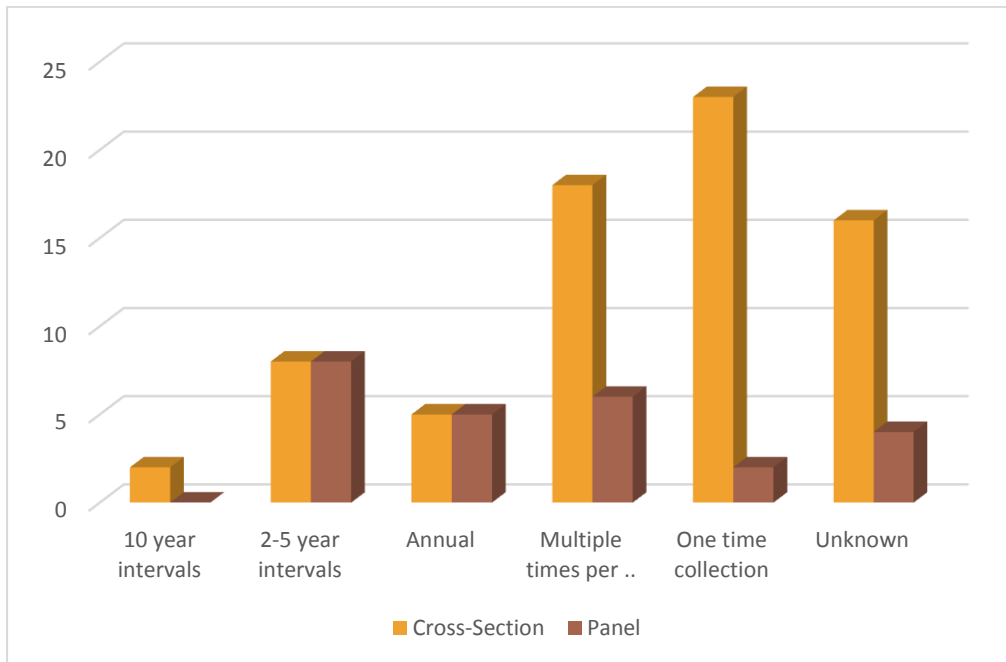
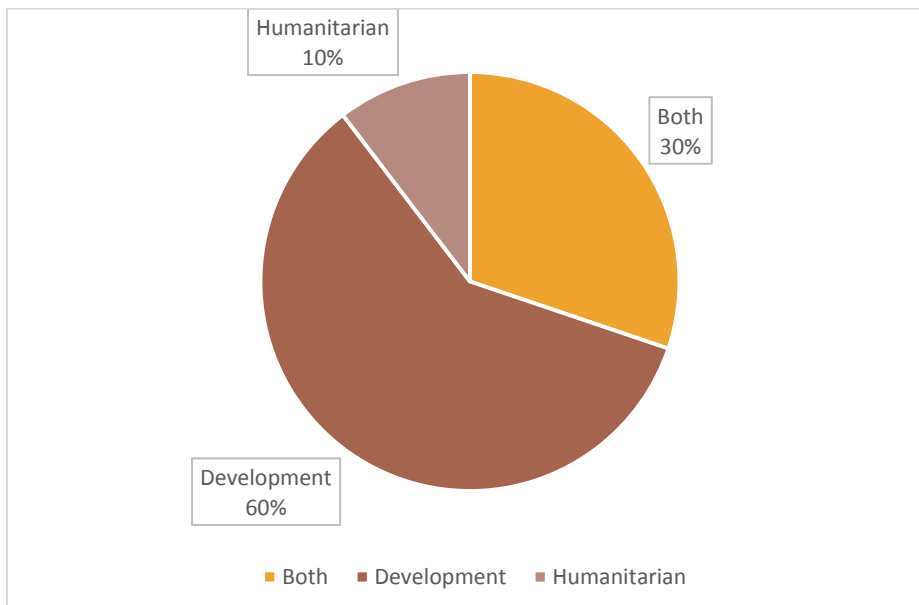


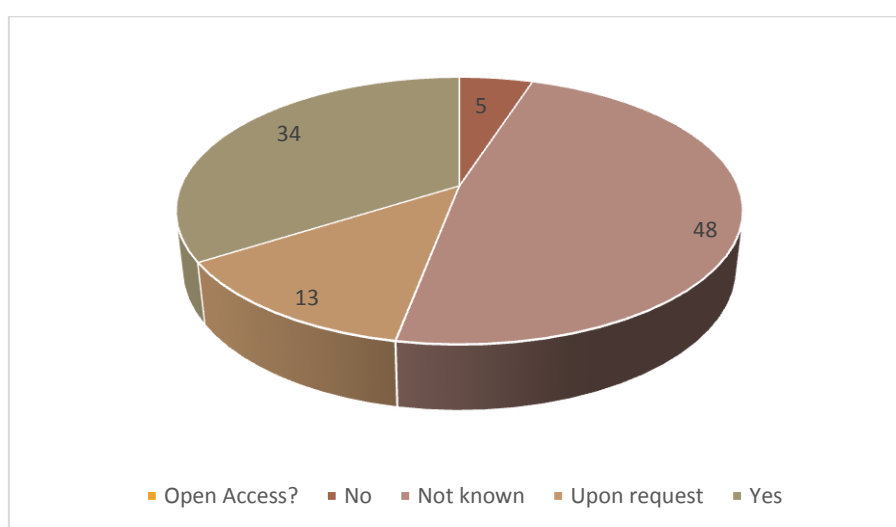
Figure 7: Purpose of data collection



¹⁷ The participatory study is: Burns, J., Bekele, G., and Akabwai, D. (2013) Livelihood Dynamics in Northern Karamoja: A Participatory Baseline Study for the Growth Health and Governance Program. Somerville: Feinstein International Center Tufts University.

A substantial part of the data mapping exercise involved identifying a range of outcomes and variables that would be suitable for measuring change and vulnerability in livelihoods in the region. (The data set for this is included as an accompanying product). Survey instruments were not reviewed in detail; however, secondary sources and descriptions of the surveys enabled all the necessary variables and indicators to be collected. The original survey instruments were researched but these were only made publically available in 36 per cent of cases. In order to thoroughly and accurately identify all of the relevant variables and the exact phrasing of the questions asked, it would have been necessary to identify all of the survey instruments, many of which would be through formal request to the survey hosting organisation. Forty eight per cent of the data sources we reviewed are open access; however, only some of these provide their survey instrument. Others make their survey instrument publicly available but not their data (Figure 8).

Figure 8: Percentage of data sources that are open access.



The main findings from the review of variables from secondary sources are shown in Table 7. What is strikingly clear is that while a number of data sources that gather information on poverty, health, assets and nutrition, there is very limited data on the extent to which this impacts on the livelihoods of pastoralists and agro-pastoralists. An ideal range of panel data indicators would include elements such as: milk production and consumption and sales indicators; dynamics of herd size; land access and use; agricultural activity and evidence of the extent which women are empowered.

Table 7: Frequency of data sources containing specific indicators

Type of indicator	Cross section	Panel
Consumption poverty	15	12
Total Income	12	12
Cash income	16	8
Subjective Poverty	5	3
Income sources	30	15
Nutrition (stunting/wasting)	19	14
Dietary diversity	17	8
Milk production	7	6
Milk consumption	8	6
Milk Sales	4	5

Type of indicator	Cross section	Panel
Health	18	16
Tropical livestock units (TLUs)	8	5
Herd size	24	15
Herd birth and death	9	11
Herd sale and purchase	13	8
Land owned	15	9
Land use	9	6
Access to grazing	12	7
Irrigated land	2	1
Crop production	16	7
Proximity to market	6	7
Migration	11	7
Remittances	5	6
Food aid	13	7
Weather variability	3	3
Women's empowerment	1	2
Productive assets	21	16
Types Shocks and Stresses	13	8
Coping strategies	16	8
Conflict and violence	7	5

Five pairs of particularly promising datasets were identified as a means of demonstrating the breadth of indicators that were collected. These include comparable indicators from household samples in similar areas overtime, allowing for the potential for useful comparison using similar indicators, across other regions and systems. These are:

- Ethiopia: Borana Plateau: PARIMA (2000-2002) and IBLI (2012-2015)
- Northern Kenya: PARIMA (2000-2002) and IBLI (2009-2013)
- Kenya: Maasai South Rift: Homewood, Kristjanson and Trench, Staying Maasai (1998-2004) and Grandin Maasai Systems Study (1981-1985)
- Karamoja, Uganda: Northern Uganda Baseline Study (2004, panel with 2008)
- Somalia: Devereux (2006) and Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation Baseline Survey Report (2013)

In addition, key datasets exist in each country that are currently a main source of data for secondary documents, early warning systems and programme development. This involves localized data collection at different stages of development and robustness, which is also useful for identifying trends and opportunities for further investment:

- South Sudan: Food Security and Nutrition Monitoring System (FSMS) Assessment Report/Bulletin
- Kenya: NDMA Early Warning Bulletins
- Uganda: Karamoja Market Update

These local data sets also have the highest probability of aiding secondary or intermediary users such as local government, extension workers and primary users of information: dryland dwellers and particularly the most vulnerable people in these regions (Tilstone et al., 2014, 1).

Data mapping conclusions

The results from the analysis of this data compilation exercise shows that there are few long runs of data, especially panel data. The majority of datasets lack consistency and compatibility of indicators. National datasets are unable to adequately represent dynamics at lower societal levels and within pastoralist systems because of inadequate methodology, access and design issues. Pastoralist systems cut across national and administrative boundaries, yet most data is confined by these established boundaries. Very few datasets are publicly available and only a very limited collection of data on indicators relating explicitly to pastoral and agro-pastoral livelihoods exists. This technical project identified five data pairs that can be utilised quickly and at relatively low cost to perform insightful and relevant analysis on changes in pastoralist livelihoods, as well as on the resilience of these livelihoods to specific shocks. The analysis (below) is recommended as follow up to this work.

Recommendations for future data collection and survey work

Improving National Level Data

→ **Evidence generation should reflect the priorities of affected communities rather than those of aid and donor agencies**, and is urgently needed for these **under-researched themes**:

- Urbanisation and small town growth
- Demographic change including population and migration
- Education and services
- Social dynamics including gender and youth aspirations
- Livelihood diversification particularly for poorer and more vulnerable groups
- Poverty and changes in assets over time
- Social safety nets
- Nutrition
- Climate change

The current literature does not reflect issues across the region as a whole with much insight focussing on pastoral livelihood trends from just a few well-studied areas, namely the Borana Plateau area of Ethiopia, Somali Region Ethiopia, and Karamoja, Uganda. South Sudan is extremely under-researched in all thematic areas. Large areas of the region are under-studied, and donors should seek to fund research that originates from the priorities of the people living in dryland areas.

There is a need to fill gaps in data collection by collecting indicators on population, livestock, land use, livelihoods (income sources) and mixed migration, as well as other major demographic indicators: pastoral livelihoods, income diversification, education and access to social services, and conflict. This can be done in large part by improving methodologies and coverage of national surveys.

Many recommendations have emerged from this research project. Drawing and extending the work of Randall (2014), below, specific actions have been identified for improving data collection and

analysis for pastoralists. If mobile pastoralists are to be represented in censuses and household surveys, especially those that are representative at the national level and used for SDG measurement, the following steps need to be taken:

Definition and identification

- Clearly define and describe the characteristics of mobile populations in different categories in the census in order for data to be compatible with other data sets;
- Instruct and train enumerators on the definitions and characteristics of mobile pastoralist populations. Include the criteria for ‘pastoralist’ in the enumerators’ manuals;
- Ensure that mobile pastoralists and other mobile populations are included in large-scale data collection exercises, including household surveys.

Develop appropriate questions

- Include questions on the different forms of human mobility associated with pastoralism: questions on whether all, part or none in a household moves with livestock would be a simple but effective way of improving understanding about mobility;
- Include questions on livestock ownership and numbers, which would allow for analysis of the contribution of pastoralism to the national economy and permit sampling of pastoralist populations in surveys;
- Develop a template and standard questionnaire for generating data related to pastoralism, livestock ownership, livestock numbers and change in pastoralist systems and livelihoods over time;
- Monitor the calendar of various population censuses and national surveys in countries with ASAL and advocate for inclusions of pastoralist modules in questionnaires.

Pastoralist-inclusive sample frames

- Ensure that sampling is conducted so that pastoralist areas and pastoralists are adequately represented in large-scale datasets. This will ensure that sufficient sample sizes are gathered to enable estimates of indicators;
- Consider defining and using sampling frames that transcend national borders;
- Include mobile pastoralists at the cartography and listing stages and make informed decisions about who is resident.

Appropriate technology to ensure inclusion in surveys

- Obtain extra information to ensure that mobile pastoralists in an area are known and included in surveys;
- Explore the use of technology, including the use of mobile phones and numbers, as a means of including pastoralists in a survey if the household is selected.

Analysis of data

- Create a facility to assist and support the various National Bureau of Statistics offices in ASAL countries to analyse the statistical data related to pastoralist systems and livelihoods;
- Census and survey reports must provide better documentation about any extra measures that have been taken to identify mobile pastoralists or specifically mention the absence of any such measures.

Improving Transparency and Access

The data mapping analysis shows that there is a lot of data being collected by different actors and for different purposes but transparency of this data is low. The data mapping process utilised the following platforms to find information on datasets. As the 'data boom' continues, datasets and methodologies need to be made public in order to allow for informed use of the data. Further investment in the use of the following platforms is recommended:

- National bureaus of statistics
- The ALNAP Humanitarian Evaluation and Learning Portal (HELP)
- REGLAP/DLCI Drylands Learning and Capacity Building Initiative for Improved Policy and Practice in the Horn of Africa Key Resilience Database
- International Household Survey Network

Collecting data useful for understanding change in pastoralist systems and pastoralist livelihoods over time

Future data collection efforts must consider measuring resilience and trends over time. Stakeholders should therefore plan and budget for the collection of panel data over long periods of time, as well as making improvements to national datasets to improve reliability and enable comparisons over time. In measuring resilience, composite indicators are often proposed. Davies et al. find that while such indices are very useful for baseline assessment of conditions in an area at a particular time, the scale at which the indicators are collected limits aggregation at a higher level and the frequency with which the data is collected provides further limitation:

'While a more inclusive resilience measure, such as a composite index, may be better suited to represent the various pillars and indicators of resilience, its complexity limits its ability to be continually updated – as required by the variance of resilience scenarios. A model that relies on data that is irregularly updated or that has too many moving parts may provide an initial baseline snapshot but may be too difficult to refresh on a regular basis. The sheer number of indicators in a composite index may prove difficult to replicate on a regular basis, given problems of data availability' (2014: 23).

Future data collection efforts intended to assist in the measuring of resilience and trends over time must consider these challenges.

Further, the majority of resilience work takes place either at the level of context (e.g., analysing rainfall, climate, environmental data) or at household level (measuring assets, coping strategies and shock responsiveness). It is imperative to start thinking about measuring resilience at the level of a system – and this means understanding how the system reacts, adapts to and recovers from shocks and stresses, including the interaction between micro (individual/ household/clan), meso and macro (or regional) levels. It will be essential to explore household bias in resilience studies, because a household's ability to adapt to change is dependent, and also affects, the system's ability to adapt to change. According to a recent review of resilience measurement methods, Downie et al argue that measuring resilience demands robust data collection for household level living standards and at the system level (2014).

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