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ORIGINAL ARTICLE

Droughts, livelihoods, and human migration in northern Ethiopia

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Abstract

Our study examines the effects of drought on livelihoods and human migration in the rural highlands of northern Ethiopia, one of the most affected regions during the 2015 drought. We conducted a household survey contextualized by focus group discussions in two rural sending areas. Drought intensity was similar in both areas, but drought impacts and farmer's response strategies differed. Overall, we observed significant strategy changes, including a drastic shift from subsistence crop production to livestock sale among farmers being dependent on the March–June rainfall (*belg* season). Our results suggest that drought increases mobility, primarily through triggering short-term migration to closer destinations to cover immediate needs like food shortages. Four out of ten households in both regions engaged in migration. Nonetheless, migration tends to be context specific with respect to barriers and opportunities for participation, with distance, duration, and perceptions of migration as well as the underlying motives being region-specific. We conclude that understanding livelihood strategy changes requires an embedding in a larger context rather than focusing on one particular driver. Migration—one important livelihood strategy in northern Ethiopia—is the result of a complex interplay of factors, drought perhaps being only one of them. Based on our finding, we reason the decision to migrate is strongly moderated by the drought rather than it is directly driven by it.

Keywords Drought · Livelihoods · Migration · Ethiopia

Introduction

Drought is a major shock for households depending on agriculture, potentially undermining local livelihoods and well-being. Drought-affected households typically have to cope with a variety of problems, including damage to crops and shortage of drinking water for humans and livestock. In large areas of Sub-Saharan Africa droughts are frequent and severe. Due to deep-rooted poverty, limited governance, and exposure to additional, non-climatic shocks, drought effects may lead to devastating socio-economic disasters, including famine and conflict over remaining resources (Baro and Deubel 2006; Ifejika Speranza et al. 2008).

The drought in Ethiopia in 2015 is claimed to be one of the worst droughts that the country experienced in more than 50 years (FEWSNET 2015). Rainfall deficits up to 50% below average have caused severe crop failures especially in northeastern parts of the country with one out of ten Ethiopians becoming food insecure (FAO 2016). Mid-term consequences of the Ethiopian drought remain uncertain, particularly since frequency and occurrence of rainfall variability and related droughts have been increasing (Bewket 2009), which is exemplified in the 2017 drought in the Ethiopian lowlands. Earlier studies have shown that given the strong dependency of Ethiopian rural households on agricultural production—with limited investment in non-agricultural activities, such as non-farm businesses, rental properties, and human capital—the vast majority of households face a significant decline in wealth during drought periods (Little et al.

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2006). The same authors illustrate for northern Ethiopia that given the significant impact of droughts on people's assets, particularly the poor get locked in a situation where once assets are recovered in the post-drought period, the next drought destroys the gains and the recovery restarts again.

One of the strategies farmers may apply in response to drought is migration since declining agricultural production forces farmers to seek alternative incomes elsewhere. In recent years, a robust body of literature on climate-migration relationships has emerged leading towards a paradigm shift in favor of acknowledging the complex contribution of climate change in migration processes (Black et al. 2011; McLeman 2013; Neumann and Hilderink 2015). Empirical research on climate-migration linkages often uses multivariate analyses of household surveys to test climate-migration hypotheses (for example, Feng et al. 2010; Henry et al. 2003; Nawrotzki et al. 2013; Van der Geest et al. 2010) or includes qualitative approaches for exploring mobility narratives (for example, Morrissey 2013; Rademacher-Schulz et al. 2014). As such, recent research shows that migration is a common household strategy for risk diversification and constitutes an established strategy to adapt to climate change (Hunter et al. 2015; Wiederkehr et al. 2018).

Although there is an increasing recognition that climatic stress can contribute to migration, there is little known regarding the importance of one specific climatic factor—drought—in relation to other (non-climatic) factors shaping migration processes. Empirical evidence for the drought-related mechanisms of human migration in Ethiopia is limited to a few studies (for example, Ezra and Kiros 2001; Gray and Mueller 2012; Meze-Hausken 2000), which we will discuss in the next section. We contribute to the existing literature by investigating livelihood consequences of the 2015 drought in Ethiopia. Other than existing studies, we illustrate the differences in drought impacts and livelihood responses, including human mobility, for two different settings in the rural highlands of northern Ethiopia, one of the most affected regions during the 2015 drought. This region is a global hotspot of increasing rainfall variability, crop yield reduction, and ecosystem change (Piontek et al. 2014). The 2015 drought is a vivid example of climate events in northern Ethiopia where droughts have been frequently occurring. To achieve our aim, we conducted a household survey contextualized by focus group discussions to disentangle mobility dynamics in two rural sending areas. Our article builds on insights from the sustainable livelihood approach and the new economics of labor migration (NELM) theory by applying these in the context of populations that decided to move during the drought. In doing so, we followed the recommendations of Jónsson (2010) who pleas for improving our understanding regarding how environmental change affects people's livelihoods, people's coping strategies, and the particular role of migration in that context.

Drought and migration in northern Ethiopia

Existing studies on drought and mobility in northern Ethiopia illustrate a complex picture. In principle, drought does not necessarily cause migration. This is mainly due to a lack of resources during drought events, which impedes households to invest in (costly) migration. However, during drought, non-environmental and context-specific factors interact with drought, eventually driving migration (Jónsson 2010). For example, Wondimagegnhu and Zeleke (2017) conducted a survey in northern Ethiopia which reveals that 95% of the respondents indicate drought as one of the factors that aggravate migration. However, other factors, including land availability, family size, livestock ownership, and intra-village conflicts, were identified to be stronger determinants for rural out-migration, which may hint at interactions between these determinants and drought. Ezra (2001) demonstrates for the drought-prone northern highlands of Ethiopia that a high vulnerability to food insecurity encourages out-migration. Although stress from drought did not appear to be a direct driver of migration, the author concludes that drought as an indirect driver accounts for almost one-quarter of all reasons indicated by the respondents. In contrast, Meze-Hausken's (2000) findings from northern Ethiopia show no correlation between the level of vulnerability and the onset of migration. Yet, a look at the different factors in detail suggests that families with a higher number of survival strategies resist migration longer than the ones with only few strategies. For the Ethiopian highlands, Gray and Mueller (2012) found a doubling of long-distance labor-related migration of men during severe drought periods; particularly men from land-scarce households engaged in out-migration. This is in line with findings from Mersha and Van Laerhoven (2016) who found—during drought periods—a higher mobility in male-headed households in the Ethiopian highlands than in female-headed households. Together, this underpins the common observation of migration as being a strategy to cope with drought. Moreover, the same authors found that marriage-related migration of women during drought was substantially lower than in normal years. This illustrates the decreased ability of households to cover wedding expenses and new household formations, findings that were also confirmed by Ezra and Kiros (2001) and Gray and Mueller (2012).

Together, these results illustrate that migration in response to drought is not equally relevant for all individuals as environmental shocks have the potential to actually decrease—rather than to increase—human mobility. Rather, drought shapes human mobility although it does not necessarily always increase it. Instead, migration tends to be context-specific with respect to barriers and opportunities for participation.

Projections for Ethiopia show that expected changes in water availability and crop productivity by 2050 will likely contribute to a significant redistribution of people with the increasingly

drying northern highlands becoming a major climate out-migration hotspot (Rigaud et al. 2018). Yet, given the complexity of climate-migration linkages, scenarios on the impact of climate change on migration have to be interpreted cautiously.

Our study contributes to the existing literature by studying drought impacts for two rural sending areas in the northern highlands of Ethiopia. Both regions were hit by the 2015 drought, yet farmers were coping with it differently. Whereas much of the existing studies on drought and migration in northern Ethiopia apply either quantitative or qualitative approaches, we draw on a combination of both to disentangle mobility dynamics for improving our understanding of the complexity of migration outcomes in the context of local livelihoods. As such, we focus on understanding the diversity of contextual factors that entail a variety of drought response strategies, which may or may not include migration.

Conceptual framework

Considering the above, one has to be cautious in concluding a direct mono-causal, uni-directional link between drought and migration. Rather, various factors come into play when making a decision as far-reaching as leaving one's home. Conceptually, it is necessary to embed environment-migration links into broader conceptual frameworks that consider people's capabilities, assets (both material and social resources), and activities required for income generation, often referred to as *livelihoods* (Chambers and Conway 1991). The Sustainable Livelihood Approach (SLA) was largely popularized during the 1990s and aimed at developing more effective approaches for poverty alleviation. The central idea of livelihood research is that poverty cannot be understood as a sole matter of income or material well-being, but rather needs to be seen as a multidimensional phenomenon (De Haan 2012). This approach is particularly helpful when examining rural populations where people use multiple strategies—farming being only one of them—varying across and within households (Scoones 2015).

Besides the SLA, the new economics of labor migration (NELM) theory provides means of understanding the causal linkages between climate shocks and migration considering wider social and structural changes (Kniveton et al. 2008). Similar as for SLA, the premise of income diversification is central to NELM, which considers migration as risk-sharing behavior of larger social units, such as families or households (Stark and Levhari 1982). Furthermore, crucial for NELM is the assumption that households aim at maximizing income as well as minimizing and spreading risks (De Haas 2010; Katz and Stark 1986; Stark and Bloom 1985; Taylor 1999). As such, migration can be seen as a household strategy with remittances and reduced total consumption in the origin household helping to overcome shocks like drought (Stark and Bloom 1985). Migration is a highly relevant income diversification strategy for subsistence farmers in less developed countries—especially in situations where livelihoods largely depend on local natural resources—who typically lack access to formal risk management options including credit and insurances (Stark and Levhari 1982).

In Ethiopia, formal insurances for crop farmers do not exist and rural households may respond differently to the risk of drought through informal insurances, such as migration to generate income elsewhere. Droughts, like the one in 2015, can affect subsistence farming households by impacting agricultural productivity, with direct consequences for the household's livelihood, such as decreasing household resources. However, rural households have learnt to deal with environmental shocks and may apply various strategies to prepare for shocks (ex ante risk mitigation strategies) and/or to respond to shocks (ex post risk-coping strategies) and hence shape livelihood outcomes depending on their sensitivity to natural hazards and their capacities to adapt (Dercon 2002). This may include diversifying livelihood strategies, including both waged and daily labor, and trade. Diversifying agricultural production is expected to play a marginal role, if any at all, since droughts typically limit the number of agricultural production strategies and often rather cause a complete failure of agricultural production. In addition, households may mortgage or sell assets, including livestock, to generate (additional) income. Migration, as shown above, may be another strategy to supply cash earnings for covering household expenses or simply to escape the challenges that emerge from life in drought-prone areas. All these strategies depend on micro factors like individual preferences, support by the community, and other household members as well as macro factors like political support (e.g., food aid) or the economic environment (e.g., employment opportunities). The different strategies shape middle- and long-term livelihood outcomes, for example, improving livelihood outcomes by finding an additional income source to cover for environmentally-induced income losses.

In order to better understand migration in times of drought, migration needs to be analyzed as one among other livelihood strategies considering various contextual factors. In the following, we explore different contextual factors and point out the role of migration among other livelihood strategies in response to the 2015 drought in northern Ethiopia.

Study area and research design

The northern highlands of Ethiopia

From an agro-ecological perspective, the northern highlands of Ethiopia are characterized by two main wet periods: the *belg* period with brief bouts of rainfall (March through June)

and the *kiremt* period with long bouts of rainfall (June through October). The belg season is typically used by smallholders only and was found to be particularly important in the northern highlands (Rosell 2011). Belg-dependent farmers are considered to be highly vulnerable to climate change including extreme climate events such as droughts (Rosell and Holmer 2007). Annual rainfall in the northern highlands typically exceeds 1000 mm but is extremely variable between years (Fig. 2). Droughts are not a new phenomenon in northern Ethiopia. However, their frequency and intensity as well as the population adversely affected by it have increased provoking a loss of livelihoods (Bewket 2009; Meze-Hausken 2004). Besides, climate-related shocks including hail, frost, pests, and diseases frequently challenge local livelihoods. Land degradation—expressed in topsoil losses and soil fertility declines—is a common consequence of human activities in the Ethiopian highlands and adds burden to securing livelihoods (Meshesha et al. 2014). From a socio-economic perspective, livelihoods in the northern highlands depend on small-scale mixed, rainfed, subsistence agriculture which is focused on the cultivation of teff (a traditional and important staple food crop of Ethiopia), barley, wheat, maize, oats, and livestock keeping. As a consequence of the nationalization of land in the 1970s, land is legally state-owned with households having formalized land use rights (Deininger et al. 2003). Besides inheriting, farmers can acquire land only through centrally organized redistributions. These redistributions together with a growing population have led to increasingly fractionalized land plots which often curtail livelihood security (Morrissey 2013). Consequently, the northern highlands are characterized by one of the lowest food security levels, expressed in dietary diversity, throughout the country (USAID Geocenter 2017). Overall, Ethiopians have become dependent on government assistance and food aid, even in years with favorable rainfall conditions (Demeke et al. 2011). Government assistance including food-for-work programs, such as the Productive Safety Net Programme (PSNP) with 8 million beneficiaries in 2015 throughout the country, is the backbone for many rural households in Ethiopia (World Bank 2016). Besides, food aid in extreme cases aims to secure a minimum level of livelihoods.

Study area South Wollo

This paper describes a study in South Wollo, located in the northern highlands (Fig. 1). This region belonged to one of the most affected ones during the big famines in 1971–1974 and 1983–1984 (Little et al. 2006) and was among the most severely affected areas during the 2015 drought (Joint Government and Humanitarian Partner 2016).

Today, the region is characterized by severe land degradation, large climate variability, and one of the highest population densities within Ethiopia (Hermans-Neumann et al. 2017). Our research was carried out in the *woreda* (district) Dessie Zuria, and data were collected in two *kebeles* (the lowest administrative unit in Ethiopia) Abasokotu and Guguftu. Both drought-affected kebeles were chosen to capture different agro-ecological zones, characterized by different altitudes,

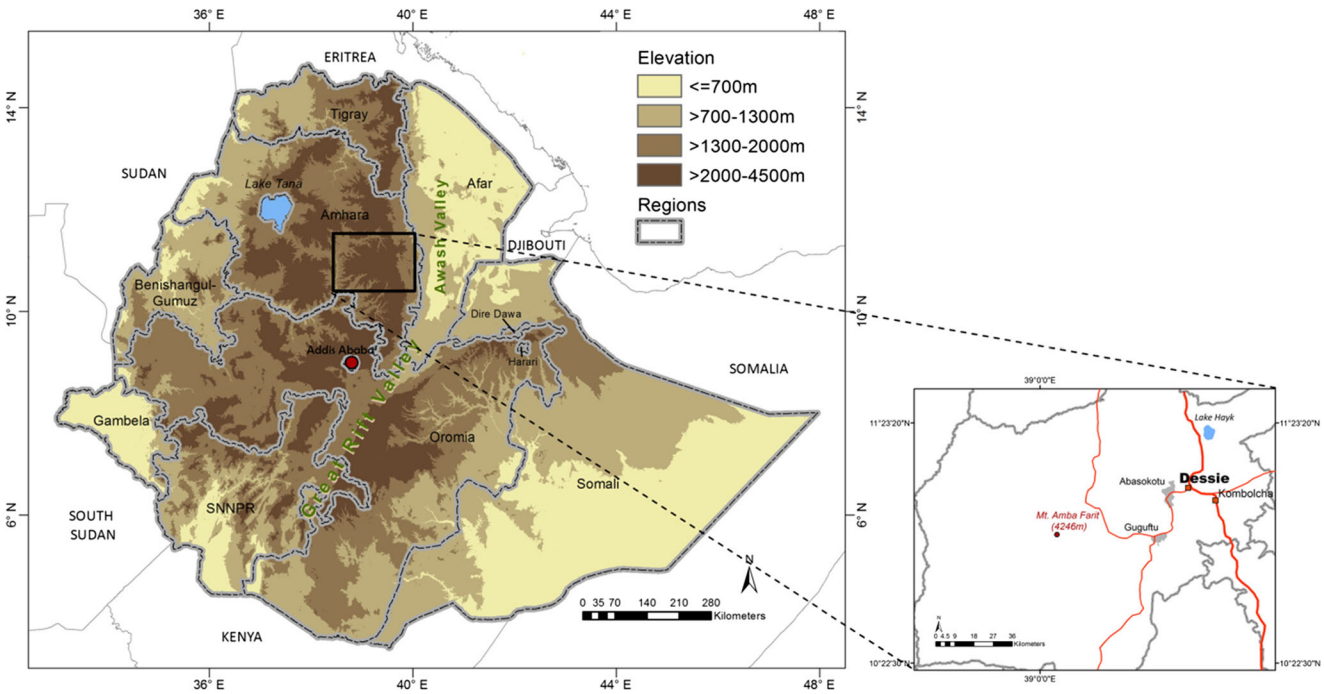

Fig. 1 Location map of the two research sites Abasokotu and Guguftu in South Wollo based on elevation data obtained from the Shuttle Radar Topography Mission (SRTM) at 250-m resolution (Farr et al., 2007). The maps show the countries administrative regions and main roads (right map)

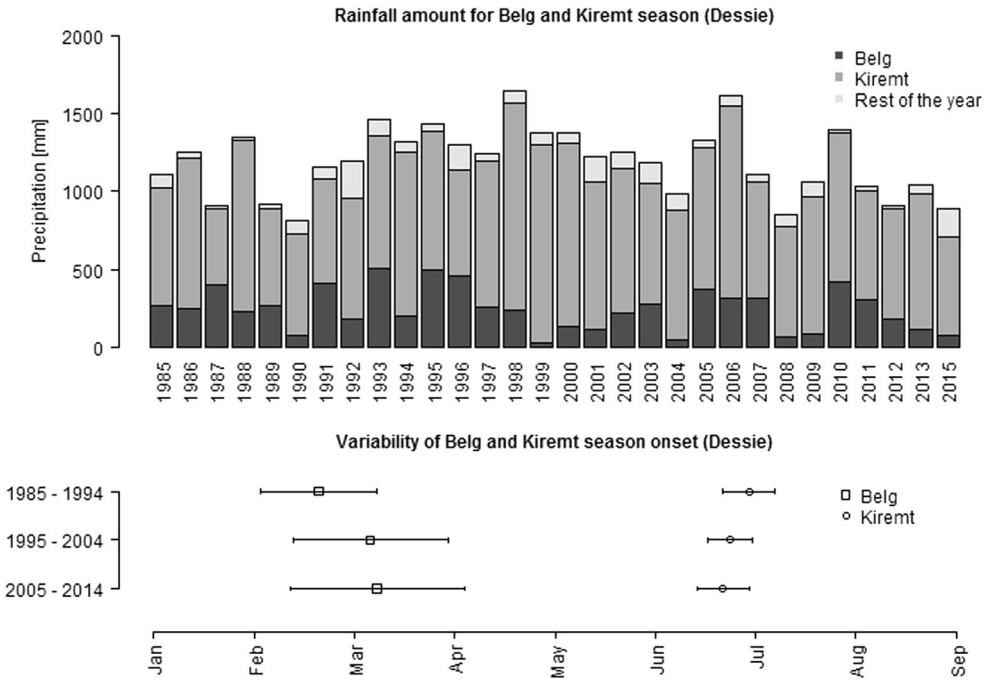

Fig. 2 Annual rainfall amounts and standard deviation for the onset of both belg and kiremt seasons for Dessie. The presented data were calculated using daily precipitation data for the years 1985 through 2015 (2014 data are missing) provided by the East Amhara Meteorology Service Center in May 2017. We defined the onset of a rainy season as the date that at least 15 mm precipitation were accumulated over three subsequent days

cropping seasons, and land management, and different proximities to Dessie city. Abasokotu is located between 2000 m and 2500 m within less than 20 km distance to Dessie city. Besides, the kebele has access to a river, which offers some opportunities for irrigation. In contrast, Guguftu is located at 3000 m and higher, approximately 50 km away from Dessie. Farmers in Guguftu depend fully on the belg rains, which is different from the situation in Abasokotu where both belg and kiremt rains are used for cropping. This is mainly because of the altitude-dependent low temperatures combined with large intensity of precipitation—partly in form of hail—which potentially destroys the harvest and let farmers in Guguftu refrain from cropping during the kiremt season. Figure 2 shows that the start of the belg season has become increasingly variable over the past 30 years.

We selected the two sites to understand how different contexts affect livelihood strategies in times of drought, particularly with respect to migration. In our study, we provide an exploratory rather than confirmatory analysis to support generating hypotheses for further research on drought and migration. Our research design benefits from covering a range of contextual factors, which is likely to increase the representativeness of the sample (Seawright and Gerring 2008).

Methodology

This study is based on household surveys that we conducted in February and March 2016. We interviewed household heads or, in case they were not available, the spouse of the household head. Two-third of the respondents were male, the average age of all respondents was 41 years. In total, our survey includes 156 respondents in Abasokotu and 159 respondents in Guguftu, representing 12% and 17% of the kebele population, respectively. The household survey covered information at both household level and individual level. Household level information included aspects of livelihood strategies, assets, land use and productivity, drought impacts, and response strategies. At individual level, basic demographic information as well as experiences and attitudes towards migration was collected. The survey contained closed and semi-closed questions, which were aimed at exploring conditions in the rural areas that were considered influencing mobility decisions according to our conceptual framework.

We contextualized these records through focus group discussions (FGDs) at both research sites, involving 64 farmers in total, with eight farmers per focus group and four FGDs in each village. We selected FGDs participants such that a variety of migration processes being common for this region was considered in the discussions, including permanent migration[1], temporary migration[2], resettlement, directly drought-related migration, opportunity seeking migration by young people, as well as international migration to the Gulf States (for detailed selection criteria see Appendix I). The FGDs addressed reasons for out-migration and perceptions of migration according to the participants' experience as well as

[1] In our study we defined permanent migration as migration of household members who left their household and had not yet returned to their household at the time of the survey (and in most instances were highly unlikely to return as indicated by the respondent).

[2] In our study we defined temporary migration as migration of household members who left their household at least for a month, but ultimately came back to join their household again.

expectations regarding migration. In addition, interviews were conducted with the development agents—village-level officers responsible for providing agricultural expertise to the farmers by offering a range of services at each site—at each site as well as with individuals working in aid and NGO positions to understand the local context of livelihoods at both sites. All interviews were conducted in Amharic making use of translators who received training prior to the survey period.

Results: livelihoods and droughts in northern Ethiopia

Livelihood strategies and drought impacts

The 315 households considered in our survey are almost exclusively smallholder farming households with more than 96% of the surveyed households usually using subsistence crop production to secure livelihoods (additional household statistics are provided in Appendix 2). A representative household cultivates between 0.3 and 0.5 ha. Considering family sizes of on average five to six family members, this illustrates the enormous land scarcity. As a consequence, fallow land does not exist. Households depend on rainfed agriculture, less than one-quarter of the households applied irrigation—pointing at a potentially high agricultural risks in drought periods. Non-agricultural income sources include selling wood, daily labor, petty trade, and pottery. In Abasokotu, 59% of the households applied at least one of these four strategies, whereas in Guguftu, this holds true for only 15% of the households given a longer distance to the market.

The cropping season used for cultivation differs between the research sites. In Abasokotu, more than 95% of the households use either the long rainy season (kiremt) or both the long and short rainy seasons. In contrast, in Guguftu, virtually all households exclusively depend on the short rainy season (belg), given the unfavorable climatic conditions (e.g., frost, hail, torrential rains) during the kiremt season. As such, in Guguftu, the potential to cultivate various crops is limited, which significantly hampers crop rotation. Consequently, soil fertility declines despite fertilizer application, which constitutes a major problem for farmers. The three most important agricultural products in Abasokotu are wheat, teff, and livestock. In Guguftu, mainly barley, oats, and livestock are produced, with the latter being particularly important for sale.

In Guguftu, there was no belg rain at all in 2015. In Abasokotu, the belg rains were late and lasted for only two days. In both kebeles, kiremt rains were late and erratic and stopped early. Consequently, except for seven, all surveyed households were affected by the drought and as such experienced a decrease in production of both food crops and fodder crops (99% and 47% of all affected households, respectively). Decreasing fodder production and deteriorating livestock conditions, or even death of livestock, were particularly remarkable in Guguftu where livestock production is a major livelihood strategy. Our results show that the vast majority of people faced food shortages as a result of the drought, which tends to be more relevant in Guguftu than in Abasokotu (Table 1). Overall, drought impacts seem to be more pronounced in Guguftu than in Abasokotu. The farmer's dependency on the belg rains largely defines the farmer's vulnerability towards precipitation variability including drought, which is in line with findings from Rosell (2011). With the growing unpredictability of belg rains, farmers in the highly elevated regions lately started cropping also during the kiremt season. Yet, given the harsh climatic conditions during this period, cropping during the kiremt season is hardly successful either, potentially even accelerating the depletion of resources, such as seeds and labor.

Household strategies in response to the drought

Traditional agricultural systems including those considered in our study have learnt to adapt to repeating environmental shocks (Gray and Mueller 2012). In our study region, farmers have developed several strategies to respond to the 2015

Table 1 Impacts of the 2015 drought for the 308 drought-affected households

Drought impact	Abasokotu ($n = 150$) percent	Guguftu ($n = 158$) percent
Food shortages	76	87
Decrease of wealth	27	46
Health issues	3	8
Impairment of education	5	13
Reduced spending capacity	11	18
Increasing market prices	1	11
No impact	4	1
Other	2	15

drought (Table 2). One of the most frequently applied strategies is selling livestock for generating income. For many households, selling livestock first of all implies a shift from subsistence food crop production to livestock production. This process was particularly remarkable in Guguftu, where subsistence crop production was the most important livelihood resource for 95% of all households before the drought. Yet, during the drought period, livestock production for sale has become the most important livelihood resources for 40% of all households while crop production for own consumption as most important livelihood resource has declined to less than 20%. Our survey did not reveal such drastic shift in livelihood strategies in Abasokotu. Besides sale of livestock, farmers applied non-farm work to secure livelihoods during the drought, including petty trade, wage employment, daily labor, baking and selling of *Injera* (a traditional national Ethiopian dish), and sale of other assets (Table 2).

Overall, during the 2015 drought, four out of ten surveyed households have introduced new livelihood strategies, hence strategies that were not applied in non-drought years. The majority of respondents reported this was done to directly address the drought impacts. On the other hand, in Abasokotu, 40% of households adapted their livelihood strategies during that period for non-drought reasons, for example, due to changing health conditions. This finding shows that a variety of factors can drive livelihood changes during drought periods.

Food aid, either as direct support or in exchange for work (PSNP), is shown to play a major role in addressing food shortages. In Guguftu, almost every single household received food aid, with nine out of ten households being dependent on relief that targets extremely vulnerable people in emergency situations. Although this share is significantly lower in Abasokotu, two out of three households there required food aid to make ends meet during the drought.

Table 2 Drought response strategies

Response strategy	Abasokotu ($n = 150$) percent	Guguftu ($n = 158$) percent
Non-farm work	39	29
Daily labor	25	21
Trade	6	7
Wage employment	6	1
Injera baking	2	1
Food aid	65	99
PSNP	53	10
Relief	9	36
Both relief and PSNP	4	53
Livestock sales	45	78
Wood sales	30	4
Migration	1	20

The usefulness of many of these risk-coping strategies can be limited by several factors, for example, many assets such as livestock cannot be subdivided so that households may refrain from sale, value of assets may decline since many households try to sell, or employment opportunities in close-by destination may be reduced due to the increasing employment demand following a large-scale shock such as drought (Dercon 2002; Gray and Mueller 2012). Considering these limitations in the context of significant poverty typically limits the household's possibilities of self-insurance against shocks such as drought, hence leading to significant reductions in well-being (Dercon 2002). Against this background, migration has been an important (additional) livelihood strategy, which we discuss in the following section.

Results: migration in the context of drought

The spatiotemporal dimension of migration

Fourty-three percent of the households surveyed engaged in some kind of temporary or permanent migration, either within Ethiopia or abroad, between 2008 (the year in which the last major drought occurred in that region) and 2016 (when we conducted the survey). The number of households with a temporary migration history is significantly smaller in Abasokotu (13%) than in Guguftu (25%), whereas the latter kebele experienced less permanent migration (29% versus 24% in Abasokotu and Guguftu, respectively). Overall, this illustrates that migration is an established household strategy in the rural highlands of Ethiopia; hence, migration is rather the rule than the exception.

Differences regarding migration processes between research sites are remarkable for the spatiotemporal dimension of migration. In Abasokotu, two out of three households that were engaged in migration sent household members to Addis, the Gulf States, or a major city in another province, such as Jimma (southern Ethiopia). Observations differed for Guguftu where short-distance movements, including migration to cities in the same province such as Dessie and Kombolcha or to rural areas, covered approximately 52% of all migration flows, followed by medium-distance movements to Addis (37% of all migration flows). The surveyed short-distance moves lasted on average four months and hit its peak in 2015, the year in which the drought started. In contrast, the long-distance migration from Abasokotu started well before 2015 and stays away from home lasted on average about two years. Altogether, this hints at a linkage between the destination and the duration of the stay, which was confirmed by other studies as the financial and temporal effort for long-distance migration is bigger (Findlay 2011; Findley 1994). As such, the lack of resources during the drought has likely hampered households in Guguftu to invest in (costly) long-

distance migration, therefore confirming earlier results from Henry et al. (2004).

Drought as a moderating factor in migration decisions

Overall, socio-economic reasons including the search for (additional) income, the ambition of independence, and the desire to seek or improve education were found to be key reasons for migration. All these motives are in line with earlier findings (Neumann and Hermans 2017) and are directly linked to the deep-rooted poverty in the northern highlands of rural Ethiopia. This poverty is amplified during the drought with severe food shortages in three out of four households and decreasing wealth in roughly every third household (Table 1). Hence, the drought puts additional pressure on people's livelihood.

Remittances can be an effective means for reducing this pressure. In our study, half of the rural households surveyed engaged in migration actually received remittances. However, only in exceptional cases money was remitted regularly; the vast majority of households relied on irregular support. Remittances were mainly received by households having a household member living in a city or abroad and were primarily used for closing the household's food gap rather than investing in farming, non-farming activities, or education, vividly illustrating that farmers were barely able to make their ends meet. These findings slightly differ from those of Morrissey (2013) who found that nearly none of the migrants in the northern highlands of rural Ethiopia sent remittances back to their households. Consequently, the author suggests that the individual's role in making mobility decisions is more important than the household's role. We challenge this conclusion, at least for temporary migrants, since a key reason—given by almost every fourth surveyed household being engaged in temporary migration—was to generate household income or cover basic needs of the household and only a minority indicated the desire to become independent of the household as a motive to leave. Besides, supporting family was by far the most important reason for returning. Yet, the bonding with the family's household seems to be strikingly different for those who moved away permanently. Permanent migration was mainly driven by the motive to become independent of the household. In Guguftu, 43% of the households engaged in permanent migration reported the desire for independence as a reason for leaving the village and no single person moved away to support the family's household. The motive of becoming independent applies mainly to members of large households, which frequently fail feeding all family members sufficiently given the significant land scarcity with plots of on average 0.4 ha. Given the small size of current landholdings in combination with low productivities, high fertility rates, and no legal opportunity to acquire land by private sale puts many young people in rural Ethiopia in the tenuous situation of landlessness without any perspective of change. As such, the household as a social unit seems to play an important role in the migration decision-making process. Household membership can trigger migration to either maintain the relationship between migrants and their household (by supporting the household through income generation) or economically decouple the migrant from the household by becoming an independent person.

Interestingly, the relevance of migration as an immediate response to the drought varied between research sites, although the percentage of households being engaged in migration is similar between both sites (40% versus 45% in Abasokotu and Guguftu, respectively). Among all households surveyed, virtually none in Abasokotu and 20% in Guguftu have applied migration as an immediate drought response strategy (Table 2). While crop growth failure has occurred at both research sites, affecting more than 90% of all households, the decision to migrate was shaped by location-specific context factors. As shown above, the drought impacts were more severe in Guguftu, which can be linked to the exclusive dependence on belg rain—which failed completely in 2015—where decreasing wealth, impairment of education, and rising market prices posed challenges beyond food shortages. Virtually all respondents relied on food aid, with nine out of ten households being part of the relief program that targets extremely vulnerable people in emergency situations such as the 2015 drought. Altogether, these factor combinations shaped the decision to migrate.

(Im)mobility and perceptions of migration

We have shown that migration is a key strategy to secure livelihoods in rural Ethiopia within the context of climatic stress. This finding is supported by the reports of non-migratory farmers that, being asked about circumstances under which they would migrate, illustrate that more than one-quarter of the surveyed farmers would move to another place if climatic conditions—including the prevailing drought—do not improve. It is remarkable that the attitude towards migration due to *continuing or potentially increasing* climatic stress did not differ between the kebeles, despite that actual drought impacts differed and that the drought was considered a major driver of migration at one site (Guguftu). This shows how different contexts can lead to different migration outcomes. Hence, whereas in Guguftu people largely left because of the drought, this reason was less relevant in Abasokotu. Yet, climatic stress was identified by the respondents to possibly become an equally significant driver of migration as in Guguftu at some point.

Although migration is a common drought response, our results also show that the majority of people do not move. Approximately every fourth non-migratory farmer indicated

that (s)he would not move under any circumstances, hence rather prefer facing death than moving. One out of ten farmers indicated either no need or no desire to migrate, primarily because their farmland is sufficiently feeding their family and because of their social and cultural bonds. In contrast, the majority of respondents were just not able to leave. Approximately one-third of the farmers mentioned the need to support their own family as a reason for staying, mainly for raising and educating their own children. Another important reason for involuntary immobility was limited health conditions, which hampered on average every fifth farmer to migrate. This finding was buttressed by the accounts of farmers who indicated they would leave their village if they would be young or in a better health condition. The example of limited health conditions vividly shows how people can become trapped in circumstances where they want or need to migrate but are not able to, so-called "trapped populations". Besides, rather low expectations regarding living conditions elsewhere, particularly high costs of living and limited job opportunities, restrained a large share of farmers from migration. Together with the fear of moving, this constitutes a migration hurdle for approximately every fifth surveyed farmer. Summarizing this, the range of immobility forms in our study is large, including people who persist because they do not need or want to move as well as people who would like to move but are unable to do so.

As the FGDs revealed, the perceptions of migration differed across the villages, which is consistent with earlier findings from rural Ethiopia (Asfaw and Zeleke 2010). In Abasokotu, migration was largely positively connoted. Most farmers highlighted the opportunities that out-migration potentially creates, emphasizing the chance to create a perspective for the future, such as building a new house based on the income generated by the migratory activities or simply "to get a better life in the future" as stressed by a female migrant who returned from Dubai. Overall, farmers in Abasokotu highlighted that migration can change life positively as illustrated by the account of a young woman who spent four years in Saudi Arabia: "It's important because there is no change here unless you emigrate." Although farmers were aware of adverse aspects of migration, due to experiences shared by returnees, these aspects seemed to be marginally influential for shaping perceptions of migration. A contrasting picture emerged in Guguftu, where most farmers pointed to the negative effects of migration including potential dangers (e.g., diseases, crime), economic uncertainties (bad working conditions), or the high living expenses at the destinations and a lacking family network as indicated by a young farmer who just returned from Dessie: "If you die there you will be buried there. It is better that you are with your family at home, for whatever problem." Consequently, migration was largely considered a last resort that helps to overcome problematic situations like severe droughts as pointed out by an elderly farmer: "Migration means leave to one's home because there is a problem." Overall, short-term migration, such as observed in Guguftu, merely serves as drought compensation and does not offer long-term perspectives, nor is it expected to serve those. Most likely, this has created the observed unfavorable perceptions of migration. In contrast, long-term migration to generate household income and create capital as it is mainly experienced in Abasokotu is perceived to be more rewarding and as such was connoted rather positively by the local farmers.

Conclusions

Our study shows that drought poses a major risk to subsistence farmers in the Ethiopian highlands and illustrates how households adapt their livelihood strategies in response. We observed significant strategy changes for the surveyed households, including a drastic shift from subsistence crop production to livestock sale among belg-dependent farmers. Overall, four out of ten surveyed households have introduced new livelihood strategies during the 2015 drought. The majority of households did this to cope with the drought impacts. However, during the same period, a significant share of households introduced new strategies for reasons other than the drought, for example, changing health conditions. From this, we conclude that understanding livelihood strategy changes requires an embedding in a larger context rather than focusing on one particular driver.

When it comes to migration as being one important livelihood strategy in northern Ethiopia, we conclude migration is the result of a complex interplay of factors—drought perhaps being only one of them—which corresponds with Black et al. (2011). Based on our finding, we reason the decision to migrate is strongly moderated by the drought rather than directly driven by it. Opinions about the rationality of migration decisions differ widely among researchers, and an ordinary distinction between rational decisions and the heteronomous influence of overlying structures in shaping migration decisions is too simplistic. Rational considerations, for example, on how to cover food shortages best possibly, influence the decision to migrate just as structural conditions do, such as employment opportunities or government support like food aid and cooperatives.

Overall, our case study suggests that drought increases mobility, primarily through triggering short-term migration to closer destinations to cover immediate needs like food. Nonetheless, migration tends to be contextually specific with respect to barriers and opportunities for participation. As such, adverse conditions—including drought—may discourage mobility by depleting the necessary resources as shown by Findley (1994), Adams (2016), and Gray and Mueller (2012). Such evidence supports the notion of "trapped populations" (Foresight 2011), which refutes the common

discourse on large-scale displacement due to climate change and instead asks for considering immobility in climate change adaptation policies.

Drought-related mobility as observed in our study hardly, if at all, enables farmers to create savings. Instead, it is rather meant to cover the main food gaps and hence can be considered as a household strategy to cope with shocks. In contrast, migration processes that are not immediately triggered by the drought rather involve long-term migration to further destinations and primarily serve the generation of capital instead of covering immediate needs. Whether migration in this context can be considered a successful adaptation strategy in our case study remains, however, debatable. This is mainly due to the large absence of financial remittances, which is a major condition for the migration as adaptation concept. Financial remittances are typically taken for granted (Foresight 2011; Scheffran et al. 2012) and given our findings—buttressing the finding of earlier studies, for example, Morrissey (2013)—should receive more attention in the recent debate about the limitations of migration as an adaptation concept (Sakdapolrak et al. 2016). Another aspect that remains to be explored is the extent to which food aid may offset food production shortages, potentially releasing the direct pressure to migrate searching for alternative incomes or food.

Lastly, our findings point to the importance of the local context in migration processes. As illustrated, the impact of the drought as well as the migration patterns may vary between locations within the same region. While the overarching climate stressor is the same—in our case the 2015 drought—impacts and coping strategies may differ locally. Although both kebeles were similarly hit by the drought and had comparable numbers of out-migrants, different motives for migration were unraveled. The mere existence of out-migration from areas affected by drought is therefore not sufficient to label it environmentally-motivated migration. Instead, additional research is required to disentangle the various pathways between drought and migration in different socio-ecological contexts. This knowledge is crucial to design effective policies to achieve sustainable livelihoods in rural, drought-stricken regions such as the northern highlands of Ethiopia.

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