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Abstract

Climate change and migration are major concerns in the MENA region, yet the empirical evidence on the impact of climate change and extreme weather events on migration remains limited. Information is broadly lacking on how households in vulnerable areas perceive changes in the climate, how they are affected by extreme weather events, whether they benefit from community and government programs to help them cope with and adapt to a changing climate, and how these conditions influence the decision of household members to migrate, either temporarily or permanently. This introductory chapter summarizes briefly the main results of the study which relied on existing data as well as focus groups and new household surveys collected in 2011 in Algeria, Egypt, Morocco, Syria, and Yemen. The results suggest that households do perceive important changes in the climate, and that many households are being affected by extreme weather events resulting in losses in income, crops, and livestock. The coping and adaptation strategies used by households to deal with weather shocks are diverse, but also limited, with most households not able to recover from the negative impact of weather shocks. The ability of community level responses and government programs to support households is also very limited. Finally, while climate change is not today the main driver of migration flows, it does appear to contribute to these flows, and worsening climatic conditions are likely to exacerbate future migration flows.

1. Introduction

Do households living in climate affected areas in the MENA region believe that changes in climate patterns and their environment are taking place? Have households been affected by extreme weather events, and in that case to what extent and which events have had the largest impact? What are the coping strategies that households declare having used, or could be using to cope with climate change and weather shocks? To what extent are perceived and actual changes in weather patterns and the environment driving temporary and permanent migration flows in MENA countries? Finally, to what extent do remittances reach households living in climate poor areas, and what is the impact of such remittances on poverty and human development indicators?

It is widely acknowledged that the MENA region will be strongly affected by climate change, and yet the current evidence on the relationship between climate change and migration in the MENA region is weaker than in most other regions (see Foresight, 2011). This study is not meant to review the limited evidence on climate change in the MENA region, nor does it provide specific policy recommendations (for a recent study doing just that, see Verner, 2012; on the evidence and policies related to climate change worldwide, see World Bank, 2010; and on migration, see Foresight, 2011). The aim of the study is more modest: it is to provide new empirical evidence on the relationship between weather patterns, perceptions of climate change, and migration so that at least partial answers can be provided to the questions asked above.

This introductory overview chapter summarizes the main results of the study. A more detailed synthesis is provided in chapter 2 (Wodon et al., 2014). The study is based in part on new household surveys collected in 2011 in climate affected areas in Algeria, Egypt, Morocco, Syria, and Yemen. On purpose, in order to achieve variability in the data collected, the selection of the countries and areas sampled within countries included some countries and areas highly vulnerable to droughts, as is the case in Syria, and others much less vulnerable, as is the case in Egypt (given that Egypt's agriculture is mostly irrigated; note that the study does not consider the threat of sea level rise, which is especially severe in Egypt). The sample of countries also included low income countries such as Yemen, and higher income countries such as Algeria, Egypt, Morroco, and Syria. Finally, the sample included countries and areas affected by diverse types of extreme weather events, including both droughts and floods (for example in some areas of Morocco).

Beyond survey data collection generating quantitative data, the study also relies in part on qualitative focus groups implemented in both urban and rural areas in the five countries in 2011. In addition, some of the analysis is based on previously existing survey data for Morocco, as well as survey and census data for Yemen. The context that led to the study and the literature to which it contributes, as well as the approach used for both quantitative and qualitative data collection are discussed in chapters 3 and 4. This introduction focuses on the main empirical results which are provided in a series of technical papers in chapters 5 through 13.

One important caveat is required before presenting the main results. It is sometimes said that *"Climate is what we expect. Weather is what we get."* Simply put, climate relates to the distribution of variables such as temperature and rainfall over a period of time, often 30 years at least. This distribution is characterized by its moments, including the mean and the variance of key climatic variables. Climate change is then used to refer to the change in the distribution of rainfall and temperature. However, it is difficult to tell if the weather experienced at any point in time is due to a change in climate (the overall mean and variance of rainfall and temperature) or is simply part of an existing distribution. The implication for this study is that our results do not provide clear new evidence on the direct relationship between climate change and migration *per*

se, but the results do contribute to the evidence on three specific related issues: 1) the impact of weather shocks on migration; 2) the impact of perceptions of recent climate change on migration; and 3) the impact of climate patterns (but not directly climate change) on migration.

2. Perceptions and Impacts of Weather Shocks on Households

Do households living in rural areas susceptible of being affected by climate change believe that changes in climate patterns are taking place? Questions on perceptions of climate change and migration were asked with a focus on events and changes that took place in the last five years, bur the analysis of migration is done both for the last five years and for longer periods.

Table 1 from Adoho and Wodon (2014a), suggests that indeed households do believe that the climate has been changing in recent years. In the combined sample for the five countries where new household surveys were implemented, more than three fourths of households declare that rain has become more erratic, and almost three quarters say that temperatures are higher. Between half and two thirds declare that there is less rain today than five years ago, that the land is dryer or less fertile, that the rainy season starts later, is shorter, or ends earlier, and that droughts are more frequent. The changes in climate in turn appear to lead to more diseases in animals and livestock, more insects and pets in crops, less water in boreholes, rivers, lakes or streams, more air pollution, more frequent crop failures and livestock loss, and more soil erosion. Some of the extreme weather events associated with climate change such as rain storms and floods are not perceived as more frequent by a majority of households, and in some cases, households do suggest that temperatures are becoming cooler, and that there is more rain, but this is a minority of households. But overall, while there are differences between households and areas or countries, there is a clear perception that the climate is worsening.

Table 1: Perceptions of Climate Change, Last Five Years, Five Countries Sample, 2011 (%)

Perception	%	Perception	%
Rain more erratic	77.52	More diseases in animal and livestock	57.45
Temperature is hotter	72.37	More insects and pets in crops	56.31
Less Rain	66.57	Less water in boreholes, rivers, lakes or streams	56.11
Land is dryer	64.84	More air pollution	55.59
Less fertile land	62.24	More frequent crop failure	55.36
Rainy season starts later	60.53	Rainy season end earlier	54.00
Rain season is shorter	60.24	More frequent livestock loss	52.47
More frequent droughts	59.09	More soil erosion	52.43

Source: Adoho and Wodon (2014a).

In focus groups as well the majority of respondents mentioned long-term shifts in climate and they attributed declining agriculture fortunes to deteriorating environmental conditions caused by changing weather patterns (Grant et al., 2014). For crops such as potatoes, wheat, and rice, the results may be devastating: *"Rice is burnt in some seasons, because we cannot find enough water to irrigate it"* (Male, 36-45 years old, Egypt[1]). The inability to earn a stable income for crops makes it difficult to rely solely on agriculture as a source of revenue. *"The conditions [for] farming are very poor. There's drought on the one hand and the unavailability*

[1] In the case of Egypt, the fact that much of the agriculture is irrigated means that results, including quotes from the qualitatiuve work, must be interpreted with care. When farmers are faced with lack of water, as this quote suggests, this may be related to shortages in the allocation of irrigation water which can themselves be due to any number of problems that need not be related to climate change, such as the upstream use of the Nile water by others.

of the new equipment and poor methods we use on the other hand. … All farmers in this region have been affected by the drought and lost their yields (Male, 35-45 years old, Algeria)*."* In Yemen, residents from Hudaydah emphasized the problems of warm weather and increasing heat waves. Furthermore, unfavorable crop prices have led some growers to shift from cultivating food crops to qat which is more profitable but requires a great deal of water: *"People there [in villages] work shoulder to shoulder, but the problem lies in agriculture. They have stopped cultivating crops … and replaced them with qat"* (Male, 30-39 years old, Yemen). Importantly, as shown in table 2, many households are affected by weather shocks, especially in terms of crop and income losses, but also in terms of losses in livestock and less fish caught.

Table 2: Economic Impacts of Weather Shocks, Five Countries Sample, 2011 (%)

	Quintiles					All
	Poorest	Q2	Q3	Q4	Richest	
Lost income	46.37	44.14	43.21	29.25	20.72	36.59
Lost crops	58.12	61.96	62.13	49.42	42.10	54.62
Lost livestock or cattle	23.81	25.19	30.11	23.17	15.23	23.43
Less fish caught	9.51	10.27	8.90	9.65	4.69	8.60

Source: Adoho and Wodon (2014a).

Additional information on perceptions about the climate, weather shocks, and their impact on households is available for Morocco through special modules on climate change and shocks incorporated in a national survey implemented in 2009-10 (Nguyen and Wodon, 2014a). In the survey, as shown in table 3, 28.1 percent of households were involved in agriculture, and among those 92.1 percent declared having been affected by deteriorating climatic conditions in the last five years. The most likely shock was a reduction in agricultural yields due to inadequate rainfall, mentioned by 62.2 percent of agricultural households. In a separate part of the survey, more than one in five households declared having been affected by a recent weather shock such as a drought or flood. Most of the households who were affected declared that they had not been able to recover from the shock, and this was especially the case among poorer households. According to regression analysis, households in the top quintile of wealth were 20 percentage points more likely to recover from weather shocks than households in the bottom quintile.

Table 3: Weather Shocks and Impact on Agriculture, Morocco 2009-10 (%)

	Poorest Quintile	Wealthiest quintile	All
Household has a member involved in agriculture or related activities	70.69	5.30	28.07
Among household in agriculture, share affected by climate-related shock			
Reduction in agricultural yields due to inadequate rainfall	60.98	50.35	62.18
Reduction in agricultural yields due to too much water	39.89	19.15	38.17
Poor soil quality due to erosion reducing agricultural yields	22.91	16.51	21.80
Changing and unpredictable climate and temperatures reducing agricultural yields	34.84	22.89	34.51
Pest or locust infestation reducing agricultural yields	14.13	7.08	17.21
Reduced job opportunities in the agricultural sector	43.75	34.15	43.86
Death of livestock due to bad weather conditions	28.37	10.41	26.44
Reduction in stock of livestock due to lower availability of grazing land	37.55	10.61	31.24
At least one problem in the last five years	93.09	81.20	92.10

Source: Nguyen and Wodon (2014a).

3. Coping and Adaptation Strategies

What are the coping strategies that households declare having used, or could be using to cope with climate change and weather shocks? In the five country sample, 60.6 percent of households declare that they have used or would use their savings, 46.8 have sold or would sell their assets, 46.2 percent have asked for a loan or would do so, 40.6 percent have sold or would sell their livestock, and 36.4 percent have withdrawn or would withdraw their children from school (Adoho and Wodon, 2014b). The proportions of households resorting to these coping strategies are higher among lower quintiles which have fewer other means to cope. There are differences between countries, especially regarding the possibility of withdrawing children from school – in Egypt this is not being considered by most households. Also, households receiving international remittances, who tend to be better off, are less likely to resort to these various coping strategies, except using their savings. The qualitative focus groups also reveal different coping strategies, including selling assets, shifting food consumption habits, and removing children from school to have them support the household (Grant et al., 2014).

Households were also asked about actions that they took or might take to cope with the loss of crops, income or livestock due to weather or environmental changes. As shown in table 4 from Adoho and Wodon (2014b), between one in four and one in five households have relied or would rely more on stored grains/products and stored water, have sought or would seek off-farm work, have used or would use more fertilizers or pesticides, or have made or would make a change in their farm production technology. Undertaking training for non-farm work or changing crop mixes and varieties is mentioned by about 15 percent of households, versus only nine percent for changing the crops versus livestock mix. Thus most households do not implement many adaptation strategies. However more than four in ten households say that they know people who have moved out of the community due to climate pressures, and 14 percent say that some people have moved in, which may generate conflict over water, land, or livestock.

Table 4: Adaptive Strategies of Households to Deal with Climate Change and Shocks (%)

	Change in production technology	Change in crops mix or varieties	Change in crops vs. livestock	More fertilizers/ pesticides	Seeking non-farm work	Training for non-farm work
Share of households	19.35	15.53	8.89	21.12	22.67	15.09
	Use of stored water	Stored grains/ products	People moving out	People moving in	Conflict over land, livestock	Conflict over water
Share of households	20.54	28.37	40.29	13.99	12.85	8.35

Source: Adoho and Wodon (2014b).

The qualitative work suggests that residents often rely on each other to cope and adapt: *"Rural residents are willing to pay [give] half of what we have to help others. If I have 10 pounds, I will pay 5. If I have 100 pounds, I will pay 50. This is how the social norms work here. We are all one family"* (Male, 36-45 years old, Egypt). Yet solidarity does not always work, and conflicts over natural resources do occur due to changes in climate, as the estimates in table 3 show. In Yemen in particular, rural residents worried in the focus groups that water scarcity has led to conflict over access to wells. One Yemeni woman described a water distribution scheme where water is distributed to certain communities on certain days of the week. For farmers in all five countries, living in impoverished rural areas is not only difficult financially, but it also has negative impacts for health, a concern mentioned in Egyptian focus groups. Farmers may be increasingly exposed to contaminated water because waste leaks into irrigation canals. Others mention being sick. With only limited income at their disposal, many households cannot afford quality health care and they also often cannot access health facilities (Grant et al., 2014).

What about community level responses? Households were asked whether to cope with the loss of crops, income or livestock due to weather or environmental changes, the communities in which they live did any of the following: planting trees or installing soil protection measures; building banks on rivers, streams or small check banks to reduce flooding; developing new infrastructure such as boreholes, wells, irrigation or roads; gathering and disseminating information on measures to reduce the loss of crops, income or livestock; taking measures to prepare for future disasters like floods or droughts; taking action to improve market access for agricultural products or handicrafts; and taking action to purchase seeds, animals or farm equipment. In most cases community action is limited. As shown by Adoho and Wodon (2014b), only one in five households declare that the community has planted trees or taken soil erosion measures, and one in seven mentioned measures to purchase seeds, animals or farm equipment. The other actions are mentioned by only one in ten households or less.

Similar questions were asked about governments, albeit with slightly different modalities, including more transfers and social protection programs, such as cash or food for work programs, cash for food during floods and droughts, as well as the provision of drinking water, the provision of skills training programs, the provision of credit during crop loss, improvements in access to markets through transportation, and price support for crops when agricultural prices are low. Except for the provision of drinking water which is probably less related to climate change and shocks, government involvement in adaptation strategies and safety nets is also limited. For most programs, only about one in ten households declared that the government has been active.

The fact that community and government programs to help households cope with weather shocks and adapt to climate change are the exception rather than the rule was also a conclusion of the qualitative work. When asked about such programs, respondents said that they were aware

of few programs and organizations geared towards assisting the rural poor affected by climate change. Participants suggested areas where government initiatives could help, such as the provision of agricultural inputs or loans to purchase machinery. Job training and improved employment opportunities were also mentioned. Yet some respondents, especially in Yemen, were doubtful that government program would bear fruit, due to corruption and distrust.

4. Migration

Migration is also a widespread strategy to cope with and adapt to changes in climatic and environmental conditions. In the five country sample, the data suggest that three in every ten households (29.9 percent) have migrants, whether residents (current members of the households) or non-residents (former members of the household). Lower rates are obtained when restricting migration to the last five years. At the individual level, 7.6 percent of individuals in the sample as a whole have migrated temporarily, and the proportion over the last five years is 6.2 percent. For permanent migration, the rates are 8.0 percent in the sample as a whole, and 5.7 percent in the last five years (Adoho and Wodon, 2014c). Most migration is internal, but the likelihood of migration abroad is high in Egypt and also in general higher for individuals from higher quintiles, as expected due to the cost of international migration. For both residents and non-residents, migration to urban areas, and especially to large cities, is much more likely than migration to rural areas.

To what extent are households migrating away from climate affected areas, and is climate itself a key push factor in such migration? This is a complex question. Regression results suggest that poor climate and extreme weather events lead to a higher probability of migration, but the role of climate is smaller than that of socio-economic characteristics and job prospects in cities. More precisely, data from the five country sample are used by Adoho and Wodon (2014c) to construct two indices or factors that summarize household perceptions regarding changes in weather patterns and the environment. The first factor captures the extent to which households perceive that the climate is becoming dryer and warmer, and it is associated with droughts. The second factor captures the extent to which households suffer from excess water, and it is associated with floods. Both factors are normalized and take a value between zero and one.

In the regression analysis with the five country sample, higher values for both factors (i.e., worse climatic conditions) result in higher rates of resident or temporary migration, with the coefficients being statistically significant and the effects of each of the two factors of a similar order of magnitude. The effects for non-resident or permanent migration are similar, although statistically significant only for the whole period, as opposed to the last five years. Thus overall higher values for both factors result in higher rates of both temporary and permanent migration, but with weaker evidence for permanent migration. The regression estimates suggest that a significant deterioration of climatic conditions would lead to an increase of about 1.5 percentage point for both types of migration. Given the overall migration rate, this increase would represent between one tenth and one fifth of the overall level of migration observed, and its magnitude is of an order of magnitude similar to that obtained when considering the reasons stated by households for the migration of some of their members.

Additional evidence for Morocco from Nguyen and Wodon (2014b) using the national survey for 2009-2010 mentioned earlier suggest that weather shocks increase the likelihood of temporary migration by slightly more than one percentage point, an order of magnitude again similar to that observed in the five country sample. While in the Morocco national survey, the impact of weather shocks on permanent migration is not statistically significant, the impact of

changing structural conditions such as reduced agricultural yields due to lack of water is, and it does contribute to higher permanent migration away from the affected areas. Finally, using a different approach based on combining census and weather station data from Yemen, Joseph and Wodon (2014a) find that climate variables do affect migration from some districts to other districts, but in a somewhat limited way, with socio-economic and cost factors playing a much more prominent role. This analysis, which is based on past data, suggest that migration flows are unlikely to increase sharply in the near term, but if conditions were to change drastically, the effect of weather variables on migration could become much larger (Joseph et al., 2014a).

The focus groups data reported in Grant et al. (2014) also suggest a link between climate and migration, although again the role of socio-economic factors is probably at least as important as that of climatic conditions. Respondents linked migration to chronic droughts which lead to declining agricultural productivity: *"The lack of water has resulted in a failure to be able to cultivate rice and it is an important crop"* (Male, 25-35 years old, Dakhalia, Egypt). On the other hand, few mentioned flooding or being displaced as a result of natural disasters as a reason for relocation. Respondents appear to choose migration after other strategies have proven unsuccessful. The qualitative work also suggests that remittances are important, especially in Yemen where there is a long-standing tradition of migration to Saudi Arabia. But conversely consequences can be severed in the absence of remittances: *"My brother is in Saudi Arabia. He used to send me money all of the time and we were well off, even when I wasn't working. [But] we lost the house and everything we [owned] because of the discontinuity of these aids. We live at God's mercy"* (Male, 30-45 years old, Hudaydah, Yemen). Participants in focus groups from Morocco and Algeria did not depend on remittances as much. Though urban residents in Algeria, Morocco, Syria and Egypt overwhelmingly report sending remittances back home, Yemeni urban respondents by contrast were more likely to receive remittances from family members working abroad, especially again from Saudi Arabia.

What happens to the migrants once they leave? Many migrants hope to work and save enough to own their own business (a small store or shop). Finding jobs, however, is not an easy feat amid widespread joblessness found throughout the region given that unemployment levels hover around 15 percent, and a much higher 20 to 40 percent among youth 15 to 30 years old. While some migrants find urban communities receptive, others say they were met with hostility: *"They look at us and call us 'Berber countrymen'. They think we are invaders"* (Male, 18-25 years old, Casablanca, Morocco). Some rural migrants said that they felt disadvantaged vis-à-vis urban dwellers because they lacked what is needed to secure proper employment, especially a degree and French-and Arabic-speaking capability, both of which tend to be needed even for jobs requiring minimal skills. For Yemenis, the main obstacle to finding a job may be corruption, which appears to be deep and pervasive: *"You need to bribe your way into a position"* (Male, 30-39 years old, Sanaa). Finding adequate housing was also a challenge: *"I'm 39, married, with five kids and I don't have a flat of my own. I pay 300 Egyptian pounds per month and cannot have a flat. Why don't they grant me one? They say you have to rent for just one year, and then it all depends on the owner"* (Male, 36-45 years old, Cairo, Egypt). *"We live on top of each other. There's no privacy. Sometimes you get your money stolen"* (Male, 18-25 Casablanca, Morocco).

Established communities that share potential migrants' lineage, tribe, or ethnic background ease the transition. Many focus group respondents spoke of relying on relatives or family friends as an intermediary for finding a job and a place to live. Networks also ease feelings of isolation. Participants mentioned that they now have only limited interactions with their neighbors, if they are fortunate to know them at all. In the words of one Egyptian woman:

"Neighbors are close in the villages. Here [in Cairo], I don't know my neighbors, what their job is or how they live" (Female, 36-45 years old, Cairo, Egypt). They also lamented the shift of emphasis away from family and traditions. Crime and harassment were also mentioned. Yet while life in the city is more "chaotic", it is also exciting and full of opportunity. In Morocco for example migration appeared to widen the options available to young immigrants as young respondents expressed a greater sense of independence, belonging, and self-actualization.

Table 5 summarizes in a very stylized way the main results from the analysis. The evidence suggests that worsening climatic conditions, or the perceptions thereof, are clearly a push factor leading to temporary migration away from the affected (mostly rural) areas, but the evidence is a bit weaker for permanent migration. It must be noted that in an analysis such as that of Joseph and Wodon (2013) which is at the level of a country as a whole, the impact of the climate on the overall patterns of migration tends to be diluted. By contrast, in the analysis based on the five countries sample, as well as when looking at weather shocks with the national Morocco survey, the effects are estimated mostly on those affected by these shocks, which also explains why the impacts are larger in affected areas. In those areas, it seems fair to suggest that climatic conditions account for at least 10 to 20 percent of the current migration flows, and this could increase in the future.

Table 5: Summary Results from Regression Analysis on Weather Shocks and Migration

Variables	Country	Paper	Temporary	Permanent	Magnitude
Perceptions of climate change	5 countries	Adoho & Wodon (2014c)	+	Weak	Medium
Recall of weather shocks and structural changes in climate	Morocco	Nguyen & Wodon (2014b)	+	Weak	Medium
Actual climate variables	Yemen	Joseph & Wodon (2013) Joseph et al. (2014)	Not applicable	+	Small
Qualitative focus groups	5 countries	Grant et al. (2014)	+	+	Substantial

Source: Authors. NA = not applicable.

5. Remittances

The last part of the study includes two chapters looking at remittances in the case of Yemen. There is evidence in the literature that migration and remittances tend to increase in response to climate shocks, so that both may function as coping mechanisms. It is not clear however whether remittances are likely to be higher in areas that suffer from poor climate in the absence of weather shocks. The first chapter in the last part of the study by Joseph, Wodon, and Blankespoor (2014) use a national household survey for Yemen combined with weather data to measure remittance flows, both domestic and international, and assess the likelihood of households receiving remittances as well as the amounts received. The question is whether households living in less favorable areas in terms of climate (as measured through higher temperatures, lower rainfalls, more variability or seasonality in both, and larger differences in a given year between extreme temperatures) are more likely to benefit from remittances. The results suggest that this is not the case in Yemen.

In the last chapter of the study, Joseph and Wodon (2014b) use matching techniques and the same household survey for Yemen combined with weather data to measure the impact of remittances, both domestic and international, on poverty and human development outcomes (school enrolment, immunization, and malnutrition). The estimations are carried both nationally and in areas with favorable and unfavorable climate. Four main results are obtained. First, remittances – which are substantial in Yemen – tend to have positive impacts on poverty

measures, school enrollment, and measures of malnutrition. Second, the impact of international remittances tends to be larger than that of domestic remittances, probably because among beneficiaries, the amount of remittances received tends to be higher for international than for domestic remittances. Third, the impact of remittances – and especially international remittances – on measures of poverty and malnutrition tends to be larger in areas affected by high temperatures, and also to some extent in areas with lower levels of rainfall, which in both cases tend to be more vulnerable. Fourth, and by contrast, in areas with higher levels of rainfall or lower levels of temperatures, where issues of poverty and malnutrition may be less severe, remittances – and again especially international remittances – tend to have a larger impact on school enrollment. Thus, in areas with unfavorable climate, remittances help first for meeting basic needs in order to escape poverty and malnutrition, while in areas with more favorable climate, remittances may be used more for investments, including in the education of children.

6. Conclusion and policy implications

A solid foundation for decision making related to climate change adaptation involves four iterative steps: (1) Assessing climate risks, impacts, and opportunities for action; (2) Prioritizing policy and project options; (3) Implementing responses in sectors and regions; and (4) Monitoring and evaluating implementation, then reassessing the climate risks, impacts, and opportunities (Verner, 2012). Our work falls squarely within the first of these four steps. As mentioned in the introduction, the aim of this study was to contribute to a better understanding of perceptions of climate change, environmental degradation, and extreme weather events and their relationship to migration and other coping strategies in the MENA region. Quantitative and qualitative data collection activities were implemented in climate-affected areas in five countries, and existing census and survey data for Morocco and Yemen were used as well. The analysis suggests that a majority of households do perceive important changes in the climate, such as more erratic rain, higher temperatures, less rain, dryer and less fertile land and more frequent droughts.

These changes have led to a range of negative consequences for agriculture and livestock production, and extreme weather events have been associated with losses in incomes, crops, and livestock. The coping and adaptation strategies used by households to deal with shocks are diverse, including migration, selling various assets and taking other emergency measures to get by, as well as changing the household's sources of livelihoods in terms of crops, livestock production, and off-farm work among others. Yet many households do not appear to use these strategies, and in addition the extent to which they benefit from community and government programs and initiatives to help them cope with weather or environmental changes is limited.

In terms of migration, the study suggests that the impact of weather shocks and deteriorating conditions on migration is positive, leading to higher temporary and permanent migration. In the areas most affected by climate change, the analysis suggests that climate factors may account for between one tenth and one fifth of the overall level of migration observed today, but this is likely to increase as climatic conditions continue to deteriorate. Furthermore, while many migrants appreciate the opportunities that migration offer, their living conditions and their ability to be well integrated in their areas of destination is far from being guaranteed, especially given intense competition for relatively few good job opportunities.

Beyond addressing an existing research gap though, the findings provide much ground for policy development. Five broad areas of implications for policy are highlighted below.

First, affected communities call for more government action to help with adaptation. In line with the conclusions reached in the recent study led by Verner (2012) on adaptation in the MENA region, we have shown the extent to which households in vulnerable rural areas are affected by climate change and weather shocks, and how their ability to cope and adapt to these shocks is limited. The cost of climate change and weather shocks is already felt today by many rural households, who are essentially left on their own in the absence of strong community responses and government programs in the geographic areas studied. While we have not conducted any cost-benefit analysis to assess which types of programs might help households the most in rural sending areas - such analysis would need to take local conditions into account, we have demonstrated the need for more assistance in order to help households cope and adapt, given the substantial damage already caused to livelihoods by changing weather patterns. The populations sampled in this study perceive a lack of effective government interventions to address the impacts of climate change and the migration it generates, and collective action solutions do not seem to work. The gap in the public provision and financing of adaption interventions leaves individuals and communities alone in making choices and decisions, including through migration. Although this leaves space for private initiatives, it also leaves the space vulnerable to forms of uncoordinated action that may lead to conflict and maladaptation.

The role of safety nets and broader social protection programs is especially important in this context, both for migrants and their families in sending areas. MENA governments should be encouraged to adopt and expand the coverage of their social protection and safety net programs. The coverage of those programs appears very thin in the areas surveyed for this study. Investments in safety net systems could have immediate pay-offs in the short-run as well as in the long-run when the consequences of climatic change may become more obvious. In addition, it would be important to highlight the fact that the design, coverage and placement of safety net programs would not be just for the purpose of minimizing the future impacts of climate change; instead safety nets should be seen as an integral part of the governments' broader strategy towards poverty reduction and urbanization and they should provide portable skills and human capital to the segments of the population that need it the most (we come back to this below).

Second, migration policy needs to understand and address climate induced migration in the context of other push and pull factors. The study has shown that while environmental and climatic factors do play a role in driving migration, a range of other socio-economic factors are at play. Although uncertainties remain as to the magnitude of future climate change and its effects on migration, focusing on environmental degradation alone as the dominant driver of migration would be misleading. Similarly, characterizing environmental degradation as key driver of transborder migration is also potentially misleading: in the countries studies, when environmental factors play a role, migration is mostly internal. These findings run somewhat against the received wisdom behind much of the recent global hype around climate migration, but they are in line with the results of other assessments, including the recently released Foresight report on environmental change and migration (Foresight, 2011). Identifying climate migration more squarely as a domestic policy issue will lead to a different type of attention to the problem for both domestic policy makers in MENA countries and donors alike.

Third, migration can be conceived of as a form of adaptation, but it is often seen as a solution of last resort by households, especially in the qualitative work presented in this study. One reason for this is that migration may be perceived as more costly than other strategies such as using savings, selling assets, getting into debt, or withdrawing children from school. In addition to material costs (travelling and re-lodging), migration implies substantial risks due to

unknown outcomes (finding other forms of livelihood) in addition to immaterial costs such those as stemming from the uprooting of individuals, households, and sometimes even communities. In some cases, those left behind, whether at the level of the household or the community may be precluded from reaping the benefits from migration, especially when remittances are hampered by the high cost of remitting or by the fact that migrants have a hard time finding jobs.

At the same time policy responses and development interventions need to recognize that migration represents a viable and legitimate mechanism through which people can address risks to their livelihoods and wider well-being, and a means of adapting to climate change and its impacts. A key question for migration policy is therefore where migration should be treated as a risk to be managed and mitigated, and where it should be treated as an opportunity to be facilitated or even encouraged. Enabling communities in sending areas to better leverage the potential benefits of migration and increase their adaptive capacity is often a better alternative than their progressive displacement. The effective economic insertion of migrants in urban areas leads to opportunities for the sending communities, particularly thanks to the transfer of remittances. For example, the evidence from the surveys and the qualitative work suggests a positive impact of remittances in areas affected by climate shocks, especially in terms of human development outcomes. Without a facilitating environment though, remittances are too often turned into pure consumption and the accumulation of non-productive assets. This type of assets can be of little value both in terms of preventive and ex-post adaptation, as their investment contribution is limited and they are not liquid enough to be used when climate impacts strike, at which point their value can drop. Policy should focus on leveraging the impacts of remittances by encouraging their productive use, for instance by subsidizing forms of de-fiscalization for remittances-funded investments and community saving schemes which also facilitate financial integration and increase liquidity.

Fourth, urban development policy is a fundamental component of the policy package to address climate induced migration. Most of the study focuses on sending areas, but the qualitative work conducted in urban areas suggests that the integration of migrants into major destination cities is not working as well as it should. The study shows that climate induced migration tends to be towards cities, mostly large ones. The policy responses to climate shocks and migration are therefore to be found in cities as much as in sending areas. Concerns about employment and housing abound among migrants, with migration simply adding to existing pressures that can be dealt with only through broad-based economic development not necessarily focused on migration per se. The climate induced migration problem should be part of a broader policy debate about urbanization. Most MENA countries are rapidly urbanizing. While the share of the urban population in the region was at 48 percent in 1980, it almost reached 60 percent in 2000 and is expected to reach 70 percent by 2015. The way MENA policy makers will address the challenges posed by climate induced migration is related to how they will manage to promote an urbanization model that welcomes the contribution of migrants to the development of cities.

Fifth, policy should focus on providing migrants with the portable skills and capabilities they need to fully exploit the adaptation potential of migration. All too often the policy debate focuses on whether migration should be encouraged or not. The study has shown that climate-induced migration is already taking place. It must therefore be accompanied. The provision of education and training can help potential migrants better grasp labor market opportunities both in sending and receiving areas, adapt to new living conditions, and shift more easily among jobs in different sectors. An emphasis on basic and portable skills would be effective regardless of the

causes, timing, and destination of the migration decisions involved. And it would benefit not only those that leave, but also those that decide to stay or eventually return.

Sixth, while dealing with climate induced migration will require some interventions specifically aimed at migrants, the policy package needed to deal with both climate change and migration is much broader. This is both a challenge and an opportunity. This is an opportunity because several levers can be applied to better leverage migration's potential for adaptation and development. But this is also a challenge because an integrated policy response will require a level of coordination and commitment that is likely to arise only through broader governance reforms and strong political leadership in MENA countries.

Finally, it is worth investigating how safeguards could play a role in reducing the risk that development initiatives result in negative impacts. For example, could inadvertent increases in the vulnerability of certain groups take place as a by-product of policies and projects that may or may not address climate change directly, such as adaptation initiatives involving resettlement and relocation? Is there a risk of maladaptation associated with interventions that are founded on unjustified assumptions about future climatic conditions and may thereby increase dependence or pressure on resources threatened by climate change? How to design safeguard mechanisms is a complex issue, if only because policy responses related to migration differ depending on whether one considers sudden-onset climate-related disasters or long-term climate-related environmental changes. But the fact that such safeguard mechanisms are needed is not itself in question.

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