Why do people persist in sea-level rise threatened coastal regions? Empirical evidence on risk aversion and place attachment

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Abstract: Climate change is projected to increase the number of extreme weather events, which may lead to cascading impacts, feedbacks, and tipping points not only in the biophysical system but also in the social system. To better understand societal resilience in risky environments, we analyzed people's attachment to place, their willingness to take risks, and how these change in response to extreme weather events. We conducted a survey with 624 respondents at the forefront of climate change in Asia: the river deltas in Bangladesh and Vietnam. Our findings confirm that most people prefer staying. Yet crucially, we find that (i) self-reported experiences of climate-related hazards are associated with increased risk aversion and place attachment, reinforcing people's preferences to stay in hazardous environments; (ii) people with experiences of hazards are more likely aspiring to move to high-income destinations, arguably being beyond the reach of their capacities; and (iii) changes in aspirations to move abroad are connected to the changes in risk aversion and place attachment. The fact that preferences are associated with cumulative experiences of hazards and interact with aspirations to move to high-income destinations may contribute to our understanding of why so many people stay in hazardous environments.

Keywords: Climate hazards, risk aversion, place attachment, international migration aspiration, societal resilience, trapped population

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1 Introduction

Climate change, particularly sea-level rise (SLR) (Storlazzi et al., 2018; Vitousek et al., 2017), will alter the ecosystems of some of the world's most densely populated and economically active coastal regions in the years to come (Church et al., 2013; Neumann et al., 2015; Nicholls and Cazenave, 2010). People living in these areas will be exposed to more climate-related hazards (Kharin et al., 2018) potentially occurring simultaneously (Zscheischler et al., 2018). Yet, there is a growing consensus among scientists that most people prefer to adapt in-situ (Hauer et al., 2020) and it is predicted that most people will move only within borders (Rigaud et al., 2018). While there is a steadily growing literature on how climate change might erode people's financial ability to move (Black et al., 2013; Groth et al., 2020) there is much less research exploring how people's preferences are affected by increasing exposure to climate-related hazards, and how this, in turn, affects their decisions to move or persist in place (Adams, 2016; Hunter et al., 2015). Taking the example of aspirations to move, our research tries to better understand feedback loops between the natural and social systems and especially how human motivations respond to an increasing number of extreme events.

Two of the main reasons to stay in place at the individual level are people's strong place attachment (Adams, 2016; Esteban et al., 2019; Laurice Jamero et al., 2017) and risk aversion (Beine et al., 2020; Goldbach and Schlüter, 2018; Jaeger et al., 2010). Place attachment refers to the bonds, emotions, and feelings that people attach to their social-physical environment (Twigger-ross and Uzzell, 1996) and risk aversion is the inclination to choose a situation with certain outcomes (e.g., staying) over a situation with more uncertainty yet with higher expected outcomes (e.g., moving to a new place)[1]. While moving abroad can be highly beneficial both for individual wages and societal welfare (Clemens et al., 2019), it is also perceived to be a costly and risky endeavor requiring a certain willingness to take risks (Bryan et al., 2014). The assumption of stable preferences has long been applied to economic models (Stigler and Becker, 1977; West and McKee, 1983) supported by

[1] While different people perceive different aspects of life as risky, one might think that staying in a climate change hotspot being exposed to natural disasters is the riskier choice compared to moving to an urban area. However, this view neglects that the risk of moving is more immediate and comes with additional unpleasant uncertainty, including the loss of one's social networks, the lack of decent housing, potential unemployment, adjusting to urban life and different cultures, including the fear of failing.

empirical evidence in certain domains (Carlsson et al., 2014; Meier and Sprenger, 2015). Therefore, economic models mainly consider changes in financial and legal constraints to affect outcomes paying less attention to social factors such as peoples' values, perceptions, and preferences (Adger et al., 2009). However, co-evolutionary perspectives highlight that human behaviors are conditioned by human biology, but cultural learning, experimentation, and imitation can change them (Norgaard, 1994). This "diffuse" co-evolutionary perspective not only focuses on genes but also on institutions, technologies, values, and beliefs. Thus, risk preferences and place attachment might change with cumulative experiences of hazards, which contain information about the fragility of the environment they live in.

In this paper, we study if international migration aspirations, place attachment, and risk aversion are associated with climate-related hazards and how these preferences interact with aspirations. Thereby, our study contributes to and tries to combine the literature on how disasters affect fundamental economic preferences and the empirical literature on climate-induced migration. First, studies on the impact of disasters show that risk aversion (Beine et al., 2020; Cameron and Shah, 2015; Cassar et al., 2017; Eckel et al., 2009; Page et al., 2014), time discounting (Bchir and Willinger, 2013; Callen, 2015; Cassar et al., 2017) and social preferences (Becchetti et al., 2017; Cassar et al., 2017; Fleming et al., 2014; Rao et al., 2011; Veszteg et al., 2015; Whitt and Wilson, 2007) can be affected by such events. With regard to risk preferences the evidence suggests that people are temporarily more risk-tolerant directly after experiencing an environmental disaster (Eckel et al., 2009; Page et al., 2014), while in the long run, they seem to become more risk-averse (Beine et al., 2020; Cameron and Shah, 2015; Cassar et al., 2017). Place attachment, on the other hand, is predominantly used as a predictor or mediating variable to explain environmental risk perception, adaptation, and coping behavior (Bonaiuto et al., 2016; De Dominicis et al., 2015; Mishra et al., 2010). Only a few studies examined how place attachment itself might be influenced by the experience of natural disasters (Ruiz and Hernández, 2014; Tanner, 2012; Willox et al., 2012). For example Ruiz and Hernández (2014) find a decrease in place attachment after a volcanic eruption for people living in the area closest to the eruption.

Second, a variety of methodologies have been used to study whether climatic factors lead people to move away, with results ranging from increased migration to people being trapped (Beine and Jeusette, 2019; Berlemann and Steinhardt, 2017; Cattaneo et al., 2019)[2]. A recent trend in the literature is the depiction of migration decisions as the joint outcome of *aspiration* and *ability* to move. This conceptual distinction proposed by Carling (2002) has been widely adopted by a broad range of scholars from different disciplines studying migration and conceptually expanded (Haas, 2021, 2010; Schewel, 2020) – (for an overview of the developments, see Carling and Schewel (2018). All these theoretical migration models have one feature in common: aspirations are the precondition for migration which both interact with micro- (individual characteristics) and meso-/macro-level factors such as the emigration environment (norms, social structures, political context, etc.). In a world of increasing migration barriers (costs, legal hurdles) migration desires often remain just that – unfulfilled desires. However, this does not mean that these unfulfilled desires cannot have consequences for the people or communities they live in. We think that making the analytical distinction between aspirations and ability underlying the migration decision is especially important when trying to understand (future) climate-related migration – which can drastically change the migration environment through repeated climate hazards or slow-onsetting changes. Identifying migration patterns based on past migration might not be very predictive of future climate-related migration (Adger et al., 2021). Furthermore, past migrants differ from non-migrants regarding their education (Drabo and Mbaye, 2015), wealth (Black et al., 2011; Bryan et al., 2014; Cattaneo and Peri, 2016), gender(Gray and Mueller, 2012; Mueller et al., 2014), risk aversion (Jaeger et al., 2010), patience (Goldbach and Schlüter, 2018), uncertainty tolerance (Williams and Baláž, 2012), and social network (Beine and Parsons, 2015; Haug, 2008, p. 200; Manchin and Orazbayev, 2018). If we want to explain differences in international migration between more and less affected people by climate hazards, we would mix both underlying processes of the migration decision (aspirations and ability)

[2] Studies vary in terms of data sources used to quantify migration (past flows or stocks vs. intentions using individual sample surveys), explanatory climatic variable (objective measures vs. self-reported perceived measures), samples (countries and time period), and the type of migration (internal, international). The field can be broadly categorized in macro and micro-level studies. First, the macro-level economic studies link migration flows and stocks between countries with long-term changes in temperatures and rainfall patterns (e.g. Beine and Parsons, 2015; Cai et al., 2016; Cattaneo and Peri, 2016). Thus, they have to aggregate the data on a coarse spatial area and focus on specific time periods. The problem here is that one cannot know whether the people who moved away were actually affected by the climatic event under investigation. Second, micro-level studies overcome this shortcoming by focussing on the migration response to a specific shock such as heat (Mueller et al., 2014) or floods, cyclones and droughts (Bohra-Mishra et al., 2014; Gray and Mueller, 2012; Koubi et al., 2016b, 2016a) in a specific country or region.

when only looking at realized migration outcomes. For example, if more affected people would be more likely to aspire to move abroad than less affected people, yet are less likely to realize their aspirations (e.g., because they formed unrealistic aspirations), then using only observed migration outcomes we would wrongly conclude that climate hazards do not affect migration decisions. Lastly, making the distinction between aspirations and the ability to migrate does not only help understand migration patterns but also informs our understanding of why people stay. Therefore, recent empirical papers have started analyzing data sets on migration intentions (Bertoli et al., 2020; Bertoli and Ruyssen, 2018) and perceived exposure to climatic events (Bekaert et al., 2021; Parsons and Nielsen, 2021; Zander et al., 2019). For example, Bekaert et al. (2021) use the Gallup World Polls data which offers individual-level survey data on migration intentions and self-reported exposure to extreme events for 90 countries in 2010. They find that the probability to intend to migrate rises with exposure to extreme events both within and across borders, especially the relative effects are largest for intentions to move across borders within the same region.

Our study seeks to go beyond the state of the art by combining these two strands of the literature using a unique dataset of affected coastal populations in two countries. We report empirical evidence from surveys conducted with people living in the Ganges Delta in Bangladesh (n=247) and the Mekong Delta in Vietnam (n=377). People living at these two densely populated sea-level rise hotspots are continuously exposed to multiple climate-related hazards. Contrary to studies using representative migration aspiration surveys (Bekaert et al., 2021; Bertoli et al., 2020; Migali and Scipioni, 2019) or studies with a focus on urban populations (Zander et al., 2019), we explicitly focus on regions where people depend on livelihood practices (e.g. fishing and farming) that are highly vulnerable to climate change. Based on respondents' recall of flooding, droughts, and storm surges in the past five years, we categorize them into three distinct groups of (i) having experienced no hazards (n=171, 27%), (ii) one or two hazards (n=211, 34%) or (iii) three or more hazards (n=242, 39%). By exploiting information on individuals' affectedness by hazards within each village, we do not measure the impact of hazards at the village level but at the individual level. This approach has the strength of reducing selection bias as one compares individuals within a community with similar context factors and not between communities that might differ in many dimensions. In addition, what matters for people's behaviors is their risk perception which is shaped by their experiences of past hazards (Grothmann and Patt, 2005; Wachinger et al., 2013). Bekaert et al. (2021) show that their results hold even when controlling for objective measures of extreme events, highlighting how people process climate change and extreme events can explain unique variations in peoples' (intended) decisions to stay or persist (Hunter et al., 2015; Koubi et al., 2016b). Our results should be evaluated and interpreted cautiously for two reasons. First, they are correlations and not causal relationships as, for example, it could be the case that risk aversion affects how people perceive and interpret the same climate hazard. Second, the sample is only representative of sea-level rise affected regions in each country and may not extrapolate to the larger populations in Bangladesh and Vietnam or other coastal regions.

2 Materials and methods

2.1 Study sites

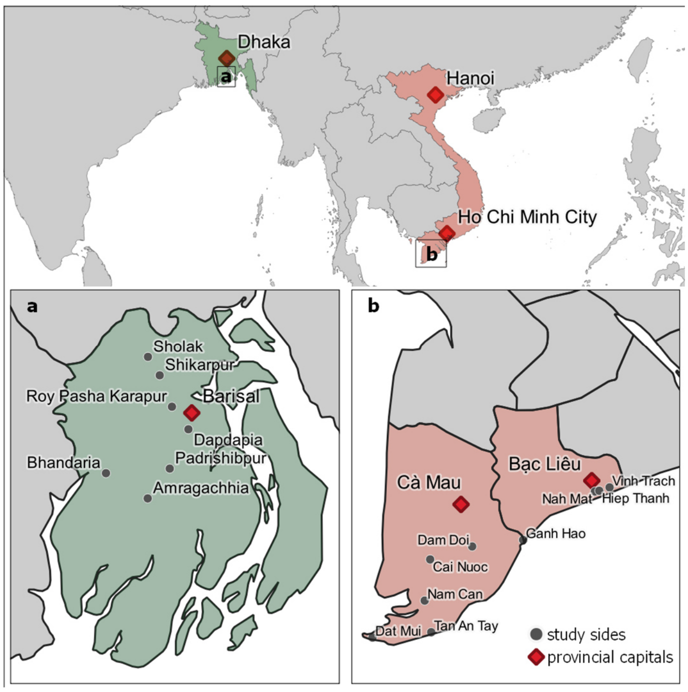
Global sea levels are expected to rise between 0.54±0.19 meters and 0.71±0.28 meters until the end of the 21st century (Becker et al., 2012; Church et al., 2013). In tropical regions, however, changes can be up to 20 percent higher (Slangen et al., 2014), where a 10 to 20 cm rise in sea levels would already more than double the number of extreme events, such as large waves, storm surges, and coastal flooding (Vitousek et al., 2017).

Bangladesh's flat topography, low-lying coastal plain with 230 rivers and river branches, high population density, and dire socio-economic situation in many regions make it one of the countries most vulnerable to extreme climate events. Our study was conducted in the Barisal division in the Ganges Delta, where people are threatened by tropical storms, typically making landfall at least once per year, cyclone-generated coastal floods, river floods, riverbank erosion, salinization of grounds, and droughts which all are expected to worsen with rising temperatures (Auerbach et al., 2015). Additionally, sea-level rise is expected to increase the severity of coastal flooding during storm surges (Bhuiyan and Dutta, 2012) and tsunamis (Li et al., 2018), as well as accelerate coastal erosion and salinization (Nicholls and Cazenave, 2010; Smajgl et al., 2015). In the five years before our data collection in 2018, the Barisal division was hit by three major cyclones in 2013, 2015, and 2016 as well as two severe floods in 2014 and 2015 (EM-DAT, 2021). According to the latest census data on population in the Barisal division in 2011, the Barisal division had a total population of almost 8.33 million and a growth rate of 1.71% compared to 2001 (BBS, 2015, 2011). Population growth is quite high considering that only 60% of those who were born in the Barisal division still live there; 21% went to Dhaka and 14% to Khulna in pursuit of business opportunities, to find work, better education, or because of marriage (BBS, 2015). Latest predictions using agent-based modeling further suggest that the population might actually increase in Bangladesh's coastal areas despite SLR (Bell et al., 2021). As of yet, environmental hazards did not seem to have resulted in widespread migration. Although it might be difficult to clearly distinguish between environmental and economic reasons to move, studies using mobile phone data found that extreme environmental events are more likely to spark short-term movements instead of permanent migration flows (Lu et al., 2016).

Vietnam, also one of the most vulnerable countries to climate change, was ranked 6th place (three places above Bangladesh) on the Global Climate Risk index in 2019 (Eckstein et al., 2019). Surveys were conducted in Ca Mau and Bac Lieu province in the Mekong Delta, which is highly exposed to sea-level rise due to its extremely flat topography; most of the Delta lies less than 2 meters above the current sea levels. In addition, the Delta itself seems to be sinking. Land subsidence between 0.35 to 1.4 meters on top of SLR of 0.07 to 0.14 meters is expected until 2050 (Erban et al., 2014). Extreme weather events such as droughts, floods, and high-intensity tropical storms are expected to increase (Nicholls et al., 2020). While most typhoons make landfall in Northern or Central Vietnam, they can have devastating consequences if they make landfall in South Vietnam. For example, typhoon Linda left 3,111 people dead, 383,000 people homeless, and caused estimated damage of over $385 million (USD) in 1997 (Anh et al., 2017). Yet, the biggest threat comes from floods during storm surges and high tides that coincide with the monsoon season. Already, water levels can rise by over one meter during this time, causing regular flooding in the region (IMHEN, Ca Mau PPC, 2011). In the five years before our data collection in 2019, the provinces Ca Mau and Bac Lieu suffered from two major floods in 2013 and 2017 (EM-DAT, 2021). Additionally, the Mekong Delta region is susceptible to severe drought events with long-term durations. The most severe drought on record took place between 2015–2016 (Guo et al., 2017). Whenever the flow of fresh water from rainfalls decreases in the dry season, saline intrusion increases in the canals and rivers. Farmers adjust by shifting crops seasonally from rice during the wet season to the considerably more risky shrimp production in the dry season. The total population of Ca Mau and Bac Lieu provinces is 1.2 mission and 0.9 million respectively, with an annual growth rate of 0.12% and 0.66% over the last 10 years (General Statistics Office (GSO), 2020). In 2019, the annual net migration rate for Ca Mau and Bac Lieu were 63 and 52 per 1,000 people respectively. According to the national migration survey, this out-migration is not driven by environmental factors, but rather by young people (85% of all migrants are between 15 and 39) in pursuit of economic possibilities, better education, or family-related factors (General Statistics Office (GSO), 2016). Recent studies using agent-based modeling to explain migration patterns suggest that employment prospects and potential income accounted for 81% of the reasons people are considering when deciding where to migrate to when leaving the Mekong Delta; education opportunities accounted only for 13% and 5% respectively (Nguyen et al., 2021).

While the Ganges Delta in Bangladesh and the Mekong Delta in Vietnam are quite different in many regards, not just in their institutions, cultures, and socio-economic situation, they nevertheless face a similar exposure to rising sea levels due to the characteristics of major river deltas (Nicholls et al., 2020). Thus, in this study, we interviewed people from two very different contexts, yet who all face the same dilemma: staying in an increasingly hazardous area or moving away.

Fig. 1. Study sites



Notes: Own creation using shapefiles from Natural Earth in QGIS.

2.2 Sampling

Our study is not a comparative case study, nor is it representative of the entire population of Bangladesh or Vietnam. Instead, we deliberately chose to conduct our study in remote areas that are most affected by SLR and where people are likely among the first to be displaced. We interviewed 247 respondents from 7 communities in the Barisal division, Bangladesh in August 2018, and 377 respondents from 9 communities in Ca Mau and Bac Lieu provinces, Vietnam in April 2019. Respondents were sampled from communities with an average size of about 200 households. While these rural communities mainly depend on agriculture, aquaculture, and fishing, they vary in their distance to urban centers with populations greater than 100,000, ranging from 7 to 39 km in Bangladesh and 6 to 77 km in Vietnam (see Fig. 1.)

In Bangladesh, research was conducted in cooperation with the BRAC Institute of Governance and Development (BIGD), who provided experienced enumerators and data on the affectedness of unions in the Barisal division, guiding our preselection unions from which we randomly selected villages. In Vietnam, sampling was conducted by identifying a list of potential research sites based on their exposure to rising sea levels and randomly selecting eight communities from the list of potential sites. Respondents were randomly selected following a random walk procedure in each community, where enumerators were given a random starting point from which they headed off in different directions choosing either the left or right side of the street, interviewing a person from every third household, and taking a left turn on every second corner. If a household was not available for the interview or rejected to participate, enumerators were instructed to go to the next household following the same procedure. All surveys were translated into the local language (Bengali, Vietnamese) and carried out with the support of tablets by local enumerators whom we trained and supervised throughout the data collection. The interviews consisted of five parts: (i) personal characteristics, (ii) preference measures and scales, (iii) migration experience and aspirations, (iv) climate change perceptions, and (v) income and wealth measures, and social networks. Respondents, aged 18 and older*,* earned on average $3.6±1 in Bangladesh and $7.3±2.6 in Vietnam for the 40 minutes long survey. Payments were adjusted to the average daily wage of an unskilled laborer in each study site and converted using the purchasing power parity (PPP) conversion factors from the World Bank to adjust for the relative price differences between countries to buy goods and services.

2.3 Measurement of preferences, aspirations, and affectedness

Risk preferences: In Bangladesh, we used the well-established staircase method to elicit respondents' risk attitudes which has been conducted with people in 76 countries (Falk et al., 2018, 2016). The staircase method confronts respondents with five consecutive binary choices between a save but lower amount and a risky lottery with a 50% chance of winning nothing or a higher amount[3]. Depending on the previous choice, respondents are then confronted with the next decision in the sequence, offering the same lottery with either a higher or lower sure amount. In this way, one can categorize respondents from risk-averse to risk-loving. One of the five decisions was chosen at random at the end of the survey to be relevant for payout. In Vietnam, we used a different well-established method to measure respondents' risk attitudes, the Gneezy & Potters (1997) investment task. Respondents are endowed with 20.000 VND and can decide how much they want to invest in a risky lottery (in steps of 1.000 VND) that pays with an equal chance three times the investment or nothing[4]. The amount that was not invested plus the potential earnings from the lottery were paid out at the end of the survey. The enumerators made sure that respondents understood the task before handing over the tablet and letting respondents make their investment decision using a slider on the touchscreen. Enumerators were explicitly trained to give respondents space and not to observe the decision to minimize potential demand effects.

Both methods measure the same underlying construct of how willing people are to take monetary risks in similar ways and in the same specific domain. To better compare the two risk measurement tasks, we standardized both risk measures between zero and one. In the multivariate regressions, we use the standardized values (z-scores that indicate how far an observation is from the sample mean in standard deviations) to be able to compare effect sizes between risk attitudes and place attachment measurements.

[3] The exact wording was as follows: “Please imagine the following situation: You can choose between a sure payment OR a lottery. The lottery gives you a 50 percent chance of receiving 240 Taka, with an equally high chance of receiving nothing. Now imagine you had to choose between the lottery and a sure payment. We will present to you five different situations. The lottery is the same in all situations. The sure payment is different in every situation. At the end of the survey, we would like to thank you for participating and give you a small compensation for your time. One of the following decisions will be chosen at random to determine your payout”.

[4] The exact wording was as follows: “You get 20,000 Dong from us at the end of the survey. Your task now is to decide how many Dong you want to keep and how much you would like to invest into a lottery. The lottery pays with 50 percent chance three times the amount you invested and with 50 percent chance your investment is lost. At the end of the survey, we pay you the earnings from this task.”

Place attachment: Places are more than just providers of natural resources, space for leisure activities, and space for living. People associate memories, emotions, and feelings with the places and the environment they live in. To measure these deeper meanings people have for places, we used a 12-item psychometric scale developed by Williams & Vaske (2003). This scale distinguishes between two dimensions of peoples' attachment to places: identity[5] and dependence[6]. All items were translated into the local language and then back to English to ensure the correctness of the meaning. The values of Cronbach's alpha statistics, a measurement of interitem covariance, for both the place identity (Cronbach's $\alpha_{Bangladesh}$=0.73; $\alpha_{Vietnam}$=0.92) and place dependence (Cronbach's $\alpha_{Bangladesh}$=0.62; $\alpha_{Vietnam}$=0.92) dimension indicate strong internal consistency of the scales Thus, the translated items seem to have relatively strong construct validity indicating that they are associated with the underlying concepts of place identity and dependence.

Aspirations to move abroad: While migration aspirations are always hypothetic, it has been shown that such aspirations are not pure wishful thinking and are predictive for both taking preparations (Ruyssen and Salomone, 2018) and actual migration (Tjaden et al., 2019). We opted for eliciting respondents' current aspirations regarding moving to another country without explicitly distinguishing between permanent or temporary movements or the amount of preparation they already took[7]. However, we did ask respondents to name a specific destination they would aspire to move to and state in an open-question the reasons for doing so. Based on respondents' answers, we can identify the following migration aspirations: (i) staying, (ii) low-income destination, (iii) medium-income destination, and (iv) high-income destination. Detailed information on the aspired destinations by study site, as well as the reasons for choosing these destinations and the perceived costs of moving there, are reported in Supplementary Section S4.

[5] "I feel that this place is a part of me."; "This place is very special to me."; "I identify strongly with this place."; "I am very attached to this place."; "Being at this place says a lot about who I am."; "This place means a lot to me."

[6] "This place is the best place for what I like to do."; "No other place can compare to this place."; "I get more satisfaction out of being at this place than at any other."; "Doing what I do at this place is more important to me than doing it in any other place."; "I wouldn't substitute any other area for doing the types of things I do at this place."; "The things I do at this place I would enjoy doing just as much at a similar site."

[7] The exact wording was as follows: "If you could migrate abroad, where (country) would you go and why (reasons)?")

Climate-related hazards & affectedness: We use self-reported variation in experiences of climate-related weather events (droughts, flooding, and storms)[8] to explain changes in risk preferences, place attachment, and international migration aspirations that shape the decision to stay or leave hazardous areas. We measured the experience of such hazards in a clearly defined time frame (five years) and domain (they personally). On average, respondents reported having experienced 2.7 (Median = 2) hazards, where for 26% of respondents the damages of the last hazard they experienced exceed their monthly household income. Recall data of past events can be noisy and prone to measurement error, as people might differ in their ability to remember such events happening or their perception of what constitutes an extreme hazard or not. If the self-reported experiences of hazards are measured with random noise, then estimates are negatively biased towards zero. For simplicity and to reduce the influence of outliers in reported hazards (one respondent reported 40 events in the last five years), we decided to categorize respondents into three distinct groups: (i) not recalling any hazard (n=171, 27%), (ii) recalling one or two hazards (n=211, 34%) and (iii) recalling three and more hazards (n=242, 39%). This categorization captures variation in perceived affectedness and vulnerability to climate-related hazards across groups. Correlations between the categorical variable of hazards and individual perceptions of past and future severity of climate impacts are positive and highly significant. Respondents that reported more hazards in the past five years are also more likely to report that over the past 10 years cyclones (r=0.34, p=0.00) and heavy rainfalls (r=0.22, p=0.00) have become more frequent, sea-water was penetrating further inland (r=0.19, p=.00), higher sea-levels in general (r=0.11, p=0.01) and more intense (r=0.16, p=0.00) but less frequent droughts (r=-0.22, p=0.00). The correlations are similar for respondents' beliefs whether the same impacts will become even worse in the next five years. They also reported significantly higher damages (costs and effort) to their houses after the last disaster (see Supplementary Table S2). Thus, these correlations suggest that our key variable of interest likely picks up (cumulative) exposure to these impacts that also shape their future impact and risk perceptions. We believe that individual self-reports of climate hazards likely better reflect individual's exposure to hazards than measures derived monitoring systems such as EM-DAT which are only available at higher administrative units. Our main reasoning why this is

[8] Respondents were asked: „How many extreme weather events, such as floods, storms or droughts have you experienced in the last 5 years?"

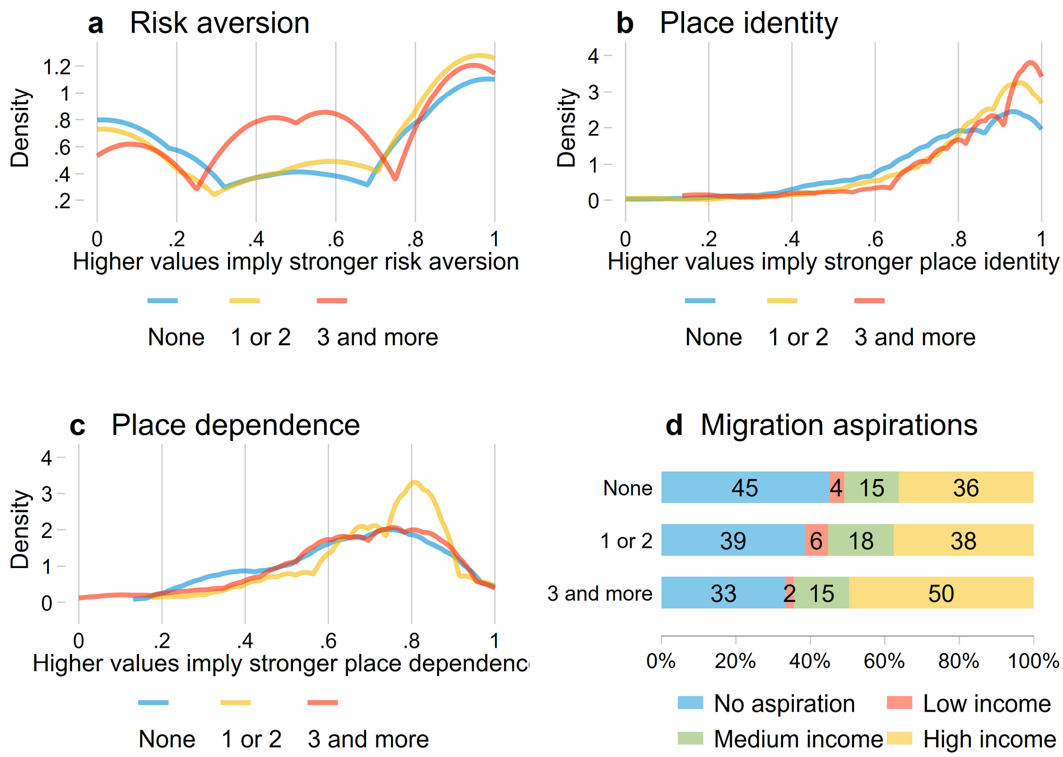
the case is, that impacts caused by floods, the main reported hazard, can be very localized. Thus, data from EM-DAT cannot reflect an individuals' own nuanced experience of a hazard. For example, within the same village, a flood will affect households in low-lying areas more than those who are living on higher grounds or who invested in protective measures, i.e. building their house on stilts.

Supplementary Table S1 provides descriptive statistics of the non-standardized outcome measures and explanatory variables. Over half of our respondents are female (55%), are on average 41 years old, and have completed about seven years of formal schooling. On average, households consist of about five members that together earn around $754 (median, PPP adjusted) per month. The climate change perception items show that respondents are highly aware of impacts and their consequences, indicating that they already seriously think about how to respond to these hazards.

2.4 Preference distributions and migration aspirations

We start with descriptively exploring if the distribution of attitudes towards risk, place identity, and place dependence correlate with the reported experiences of climate-related hazards. Fig. 2, panels **a** to **c** show the estimated kernel densities of risk preferences, place identity, and place dependence for respondents not recalling any, recalling one or two, and recalling three and more hazards in the last 5 years. On average, respondents tend to be rather risk-averse than risk-loving ($Mean_{risk}$=0.59±0.37), 31% of respondents are even completely risk-averse on our measures. The distribution of risk preferences for the two less exposed groups looks similar with two peaks at the extremes of the distribution. However, having experienced three or more hazards appears to correlate with stronger risk aversion relative to the group that reported none (Kolmogorov-Smirnov (KS) Test D=0.17, p=0.01), with an additional peak in the middle. Panel **b** and **c** showing place identity and place dependence highlight respondents' high levels of attachment ($Mean_{identity}$=0.85±0.17, $Mean_{dependence}$=0.69±0.18). Respondents who reported experiences of hazards seem to have a stronger place identity, indicated by the significant shift of probability mass to the far right of the distribution for both groups (KS-Test; '1 or 2': D=0.13, p=0.07; '3 or more': D=0.16, p=0.02). Regarding the place dependency dimension, we only observe a higher density for the group who reported one or two hazards (KS-Test D=0.16, p=0.02) but not three and more (KS-Test D=0.05, p=0.97).

Fig. 2. Distribution of preferences and migration aspirations across groups



Notes: We plot the kernel density distributions of risk attitudes (panel **a**), place identity (panel **b**), and place dependence (panel **c**) over the three groups based on the number of self-reported hazards experienced in the past five years. Panel **d** shows respondents' migration aspirations. Besides, we asked respondents to self-assess all possible costs of moving to the aspired destination, including their costs for living there during the first month. Based on aggregated costs of moving to the aspired destination, we created three distinct groups of destinations: (i) low income (mainly India), (ii) medium income (mainly Middle Eastern countries), and (iii) high-income (i.e., Europe, North America, East Asia). For details on the exact aspired destination, see Supplementary Section S4. While individual estimates of these costs are noisy, aggregating them reveals a realistic picture of migration costs. The average self-assessed migration costs strongly correlate (Pearson-correlation r=0.72, p=0.00) with legal labor migration costs estimated based on data from the 2009 Bangladesh household remittance survey (IOM, 2010).

The communities and places people live in form important parts of their identities which they highly value and understandably do not want to abandon easily. While people with high place attachment may aspire to form meaningful relationships and strong ties to their local community other people might have different ambitions, desires, and aspirations for their life such as providing a good education for their children, enjoying a higher living standard, or having better economic opportunities (see Supplementary Table S19). For rural residents, migration might be the only solution to reach these goals. First, we find that 38% (n=239) of respondents, state that they either had no desire to move abroad or never actually thought about it (see panel **d**). The share of respondents reporting no aspiration significantly decreases by 12 percentage points (pp) for respondents who reported three or more hazards (Pearson Chi^2=5.67,, p=0.02). Thus, cumulative experiences of hazards seem to correlate with the desire to move abroad, especially to high-income destinations in North America, Europe, or East Asia for the most affected respondents (Pearson Chi^2=7.23, p=0.01). Of course, as indicated by respondents themselves, it is unlikely that they can realistically act on these aspirations given the substantial financial and legal barriers to migrate to these high-income countries (see Supplementary Figure S5). The aggregated self-assessed costs of moving to high-income destinations exceed almost three times the respondents' average value of assets[9].

2.5 Statistical analysis

In the following results section, we rely on multivariate least-square regressions for the preference outcomes. For migration aspirations, we use nonlinear functions to model the conditional probability function of the categorical dependent variable.

As one cannot randomly allocate people to be exposed to differing numbers of hazards, people may differ in education or wealth, which can explain variation in the reporting of climate-related hazards. However, previous studies have provided evidence that changes in preferences are more than correlations as they do not stem from selective exposure to disaster or selective out-migration in response to such events, or other changes in the economic environment (Callen, 2015; Cassar et al., 2017). We do not find much evidence for selective exposure, as observed socioeconomic differences do not explain much of the variation in the reported number of hazards (Adjusted R-squared = 0.01, see Supplementary Table S4). In addition, 72% of respondents are still living in the same village they were born in, and only 11% of respondents moved in the last 10 years. Thus, there was relatively little in-migration going on in the recalled period. Restricting our analysis to only respondents who were born in the village where we interviewed them, yields similar but less precise estimates due to the exclusion of 28% of respondents from the analysis (see Supplementary Table S14). Supplementary Table S3 shows some slight imbalances between groups in terms of income, where more affected respondents have slightly higher incomes. We control for these imbalances and either include country or village-fixed effects. With the fixed effects we want to remove unobserved heterogeneity between villages in our data. The model with village fixed effects allows for the intercept variable to differ across villages but the slope of the estimate to be constant across all observations. Especially for migration aspirations, we believe that unobserved variables that systematically differ between villages could be correlated with the explanatory variables, and thus, biasing our results. In addition, we

[9] A conservative estimate, assuming that respondents could sell all their movable and immovable for their self-assessed value.

account for the issue that the variance of the error term depends on the value of the independent variable using Eicker–Huber–White heteroskedasticity robust standard errors. We estimate variations of the following models for the different outcome variables, for example for the risk aversion model we estimate:

$$Risk\ aversion(z - score)_i = \alpha_1 + \beta_1 Group(1\ or\ 2) + \beta_2 Group(3\ and\ more) + \beta_3 Controls_i + \beta_4 Damages_i + \beta_5 Z_i \varepsilon_{i1}$$

The coefficients $\beta_1\ and\ \beta_2$ capture the effect of the dummy variables of having experienced "one or two" and "three or more" hazards in standard deviations of the outcome variable relative to the omitted group that did not experience any hazard. The vector of $Controls_i$ includes a set of socio-economics: gender, age, marital status, household size, education, household income, and wealth. We log-transform the reported income and asset values to reduce the influence of extreme outliers on the regression estimates. The vector of $Damages_i$ includes land lost to erosion and an index that captures the costs caused by the last hazard to control for the potential effect on preferences because of reduced wealth. As the self-reported measures of house rebuild frequency, effort, and costs are highly correlated, we use principal component analysis to build a one-dimensional index that captures variation in these variables. Lastly, we control for potential unobserved differences at the village level where the surveys were conducted by including a set of village dummies Z_i.

3 Results

In line with previous findings, we find that most respondents (66%, n=411) would only recommend in-situ adaptations to their peers and view moving away mainly as a last resort if all other adaptation strategies fail (see Supplementary Figure S1). Contrary to the depiction of a population trapped by their financial constraints (Black et al., 2013; Cattaneo and Peri, 2016; Nawrotzki and DeWaard, 2018) most of our respondents could afford moving to domestic urban centers or even to close-by countries assuming they could sell their assets (see Supplementary Figure S5). We start with analyzing if people's preferences and migration aspirations are affected by reported climate hazards.

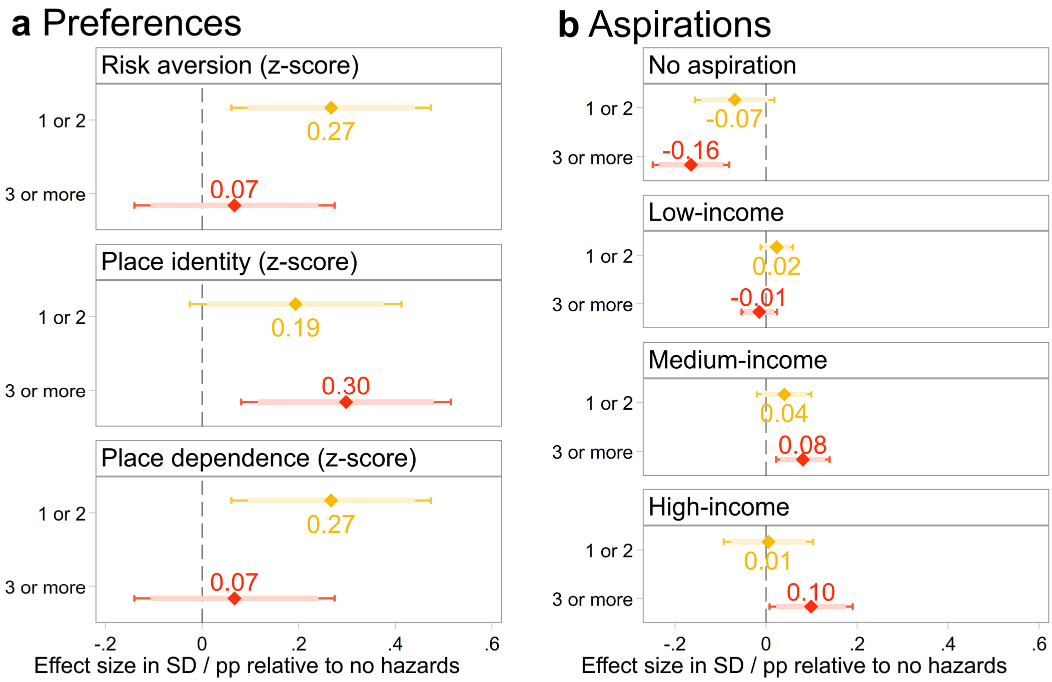
3.1 Direct relation between hazards, preferences, and aspirations

Using multivariate regression analysis the descriptive results on distributions are confirmed, showing that preferences are systematically associated with climate-related hazards when controlling for socioeconomic differences across groups and the intensity of damages caused by the most recent hazard (see Fig. 3). The interested reader can find the main regression tables reporting all coefficients of the control variables in Supplementary Tables S5 (preferences) and S6 (migration aspirations). Respondents who have reported one or two hazards are more risk-averse by 0.2 standard deviations (SD) ($ß$=0.20, p=0.06, $95CI$=0.00, 0.41) and those who reported three and more by 0.23 SD ($ß$=0.23, p=0.03, $95CI$=0.03, 0.43) than respondents who reported none. These effects translate roughly into a 12% increase in risk aversion. In comparison, Cassar et al. (2017) find a 20% increase in risk aversion five years after people experienced the extraordinary 2004 tsunami in Thailand. We find similar effects on place identity, which is higher by 0.19 SD for respondents who reported one or two hazards ($ß$=0.19, p=0.08, $95CI$=-0.03, 0.41) and by 0.29 SD for respondents who reported three and more ($ß$=0.29, p=0.01, $95CI$=0.07, 0.50). Place dependence, on the other hand, does not seem to correlate in the same way as place identity with the number of experienced hazards. Respondents who reported one or two hazards tend to have higher place dependence by 0.26 SD ($ß$=0.26, p=0.01, $95CI$=0.05, 0.47), while respondents who reported three and more hazards have place dependency levels comparable to respondents who reported not having experienced any hazards ($ß$=0.06, p=0.58, $95CI$=-0.15, 0.27). Fig. 3, panel b confirms the descriptive results on aspirations showing that those people who reported three and more hazards are significantly more likely to have formed an aspiration to move abroad, especially to high-income destinations ($ß$=0.10, p=0.03, $95CI$=0.01, 0.19). Respondents who reported three and more hazards are 17 pp less likely to have no migration aspiration than respondents who reported none ($ß$=-0.17, p=0.00, $95CI$=-0.25, -0.08).

To sum up, cumulative experiences of climate-induced hazards not only seem to correlate with higher aspirations to move abroad but also with people's preferences. Respondents who report having experienced climate-induced hazards in the last 5 years tend to be more risk-averse and more attached to their place of living. Past research suggests that both stronger attachment (Adams, 2016) and higher risk aversion (Beine et al., 2020) should make it less likely for people to form aspirations to move abroad. Yet, we find the opposite, most strongly for respondents who report three and more hazards.

This group seems to be more likely to aspire to move abroad, especially to high-income destinations, which are likely outside the scope of their capacities. In line with argumentation, we find that respondents with an aspiration to move abroad and who reported to have experienced more climate hazards self-evaluate their likelihood to act on these aspirations in the near future as significantly lower compared to less affected respondents (see Supplementary Figure S4).

Fig. 3. Preferences and aspirations associate with reported hazards



Notes: Plotted are the coefficients for respondents who reported having experienced one or two hazards (yellow) and those who reported having experienced three and more hazards (red) on preferences (panel a) and aspirations (panel b) with 95% (thin lines) and 90% (thick lines) confidence intervals. Control variables include land lost to erosion (=1), house rebuild index (PCA), gender, age, marital status, education, household income (log+1), household wealth (log+1) proxied by owned assets, and household size. In all models, we control for village fixed effects to account for unobserved differences across communities that could affect outcomes.

3.2 Indirect relation of hazards and migration aspirations through preferences

Next, we explore whether changes in migration aspirations are connected to changes in risk preferences, place identity, and place dependence or whether these effects are independent of each other. We look at two aspiration outcomes: (i) do respondents aspire to move abroad, and (ii) is the aspired destination a high-income country. We estimate average marginal effects for respondents that did not experience any hazards, experienced one or two, or experienced three and more separately using a sample split[10], controlling for factors likely shaping migration aspirations such as age,

[10] As a robustness check, we use pooled linear probability models where we interact the hazard measure with each preference in a stepwise fashion (see Supplementary Table S17). The results for risk aversion are similar to the results from the sample split analysis. The significant joint F-tests of the interactions show that the effects of exposure to hazards on having any migration aspiration are modified by risk aversion and place attachment. Risk aversion still dampens the effect of having experienced more than three hazards on the aspiration to move abroad (and a high-income destination).

education, income, and wealth. For brevity, the non-significant effects for respondents that reported no hazards are reported in the supplementary section, not in the main text (see Supplementary Table S15). The results indicate that more educated and wealthier respondents are more likely to aspire to move to high-income destinations, which is in line with studies showing that successful migrants differ significantly from the average population regarding their capacities (better educated (Drabo and Mbaye, 2015), wealthier (Black et al., 2011; Bryan et al., 2014; Cattaneo and Peri, 2016)). For participants reporting three and more hazards, the results further suggest that the desire to move abroad is significantly correlated with risk preferences, after controlling for the above-mentioned factors (see Fig. 4, panel **a**). A one SD increase in risk aversion is associated with a 7 pp lower likelihood to aspire to move abroad for this group (β=-0.07, p=0.04, *95CI*=-0.13, -0.00). While one might expect that with exposure to more flooding or storm surges uncertainty regarding the current location would rise, the most affected respondents may also perceive the prospect of moving to another country as riskier – rendering international migration as less desirable than adapting in-situ and waiting for a policy solution. Similarly, we find that respondents who identify more strongly with their current location are significantly more likely to aspire to move to high-income destinations, but again only for the group that reported three and more hazards (see panel **b**). Cumulative experiences of hazards alter the relationship between place identity and these aspirations, where a one SD increase in place identity is associated with an 11 pp increase in the likelihood of aspiring to move to a high-income destination (β=0.11, p=0.00, *95CI*=0.04, 0.18).

To sum up, cumulative experiences of hazards not only affect preferences directly but also the relationship between preferences and international migration aspirations. In addition, we find some heterogeneous effects on migration aspirations depending on how far villages are away from the next urban center with more than 100,000 residents[11]. Respondents from communities further away from urban centers tend to be significantly less likely to aspire to move to medium-income destinations with more experienced hazards compared to respondents living closer to urban centers (see Supplementary Table S18). Thus, respondents from peri-urban communities tend to have more

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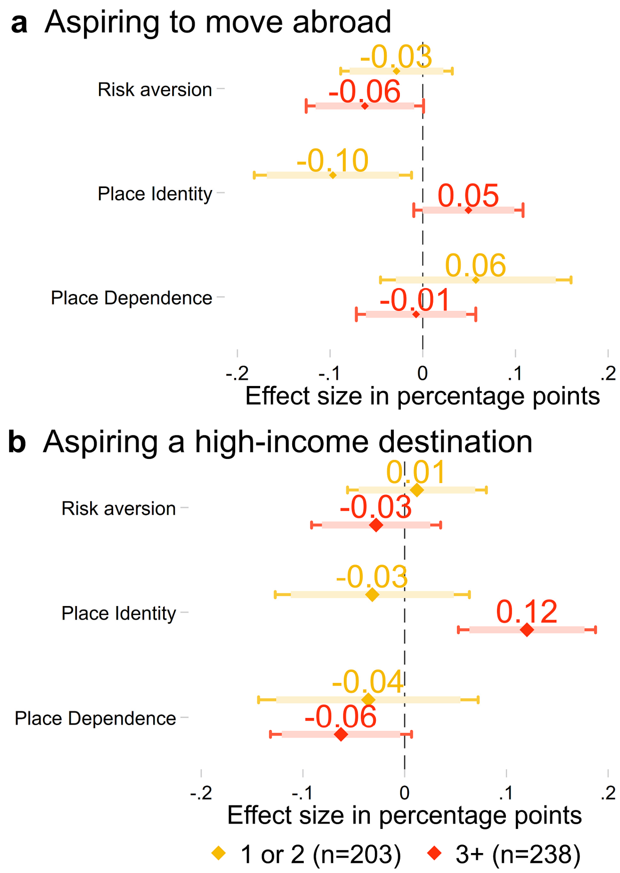
Regarding the interaction effect of place identity, we only find that place identity is associated with aspirations to move to a high-income country, but this is not significantly amplified with more frequent exposure to climate hazards.

[11] We thank the anonymous reviewer for the suggestion to investigate heterogeneous effects on migration aspirations depending on whether respondents live in more urban or rural areas.

realistic aspirations to medium-income countries than rural respondents which tend to aspire to move to high-income destinations in our sample.

Fig. 4. Effect of hazards through preferences on aspirations



Notes: In panel a, the dependent variable is a dummy variable capturing whether the respondent stated an aspiration to move abroad (=1) or not (=0). The dependent variable in panel **b** is a dummy variable capturing whether the respondent aspires to move to a high-income destination (=1) or not (=0). Estimation results for respondents who reported having experienced one or two hazards (yellow) and for respondents who reported having experienced three and more hazards (red) are average marginal effects obtained from Probit regressions with 95% (thin lines) and 90% (thick lines) confidence intervals. Additional control variables include land lost to erosion (=1), house rebuild index (PCA), gender, age, education, household income (log+1), household wealth (log+1) proxied by owned assets, and household size. In all models, we control for country-fixed effects. Full regression outputs, including the group that experience no hazards, are reported in Supplementary Table S16.

3.3 Study limitations and robustness checks

Our results should be interpreted with caution for several reasons: (i) we measure aspirations to move internationally and not actual movements, (ii) we use self-reported measures of exposure to hazards, and (iii) our sample is not representative of the population of Bangladesh or Vietnam, because we specifically interviewed coastal populations that live in areas most affected by rising sea levels. First, we acknowledge that migration aspirations are not a good proxy for actual migration flows (Abel, 2018). However, there is increasing empirical evidence that the same factors that shape migration aspirations also affect subsequent steps such as migration intentions (Manchin and Orazbayev, 2018; Migali and Scipioni, 2019), preparations (Ruyssen and Salomone, 2018), and actual migration

(Creighton, 2013; Docquier et al., 2014; Tjaden et al., 2019). As highlighted by the two-step approaches, actual migration is the joint outcome of aspirations and ability to move, where the latter is clearly lacking among respondents in our sample as most will not have the means to act on their aspirations to move abroad. We focused on (permanent) international migration aspiration for two reasons: First, most of our respondents have the means to migrate domestically or to neighboring countries but do not do so. Potentially, because they would only migrate if it would mean a substantial improvement to them. Otherwise, they might stay in hazardous environments until they are forced to leave, as highlighted by our conceptual model. Second, the media often speaks about climate migrants, and we wanted to show that those most affected are far from being able to move internationally and that those fears are highly exaggerated and irrational.

Second, self-reported measures of perceived exposure to climate hazards are always prone to recall bias and measurement error. Recall bias might be less of a problem with low-frequency high-impact events than in high-frequency data (Bell et al., 2019). Of more concern is that respondents report different numbers of hazards depending on individual social-psychological factors, which could be consistent with the literature showing that climate risk perceptions are affect by personal experiences of extreme weather events among socio-demographic and cultural factors (Van der Linden, 2015). Then, we would have a measure that captures the combined effect of perception and vulnerability to an exogenous impact. Thus, self-reported experience of climatic events might not match real (or observed) extreme climatic events. However, Hunter et al. (2013) showed that aggregated self-reported measures of drought were strongly associated with objective measures of rainfall in Australia. Similarly, Edwards et al. (2020) using a Filipino sample find that aggregated disaster exposure also correlated well with disaster exposure using EM-DAT data. As we are interested in cumulative and diverse hazards one cannot easily use an all-encompassing source of geo-data that includes floods, typhoons, droughts, landslides, etc. Similarly, we do not have official data on destroyed houses over these hazards, nor can we verify how our individual respondents were affected by these events as EM-DAT data are restricted to division levels. Nevertheless, we believe that self-reported individual exposure is a relevant and valid source of information for our research question. As a robustness check, we generate an individual-specific average exposure to climate hazards based on other participants' reports of hazards in the same community. Our results for risk preferences are robust to using the aggregate measure, while the association with place identity and dependence is not (see Supplementary Table S14). However, this analysis is also less than ideal for two reasons. First, the aggregate measure in this analysis could be imprecise as it assigns respondents who did not report any experiences of hazards in the past five years on average with 2.6 hazards. We believe it is very likely that some individuals remain largely unaffected by some hazards as they might have prepared their belongings better or live at a safer place within the village that is less affected by winds or floods. Second, the interpretation of the model is different as we cannot rule out village-specific characteristics through the inclusion of village fixed effects with the aggregate measure. While individual reports of climate hazards are prone to outliers and potentially shaped by individual characteristics, the aggregate measure takes away all variation of hazards within villages. We think the grouping of reported hazards offers the best compromise to understand individual responses (risk aversion, place attachment, aspirations) by allowing individual variation in reported hazards within communities while also rigorously constraining outliers to a maximum of "three and more".

Lastly, one might be concerned that people have moved between the occurrence of climate hazards (we used the past five years) and the time when we interviewed them. This would be problematic if a large proportion moved and especially when these people were systematically less risk-averse and attached to their communities. Since we would not have them in our survey, our results might then be driven by a selection bias, only interviewing more risk-averse and place-attached people who remain in these hazardous areas. However, studies show that major out-migration did not happen yet (Adger et al., 2021) and that people rather move temporarily and short distances to urban centers in response to fast-onset disasters like floods and cyclones (Lu et al., 2016), and return as soon as possible (Hauer et al., 2020). At our study sites, the last disaster registered on EM-DAT took place 27 and 20 months before we conducted our surveys, in Bangladesh (cyclone) and Vietnam (flood) respectively. Thus, most people will likely have returned to their villages and are included in our sample. In addition, highlighting that the scope of out-migration cannot be that big, the population of Bangladesh's coastlines is expected to increase (Bell et al., 2021). Those who do migrate seem to be manly young people in pursuit of economic opportunities, better education, or marriages, not environmental concerns (BBS, 2015; General Statistics Office (GSO), 2016; Nguyen et al., 2021). As a result, it seems unlikely that our results are due to talking only to the most attached and risk-averse people.

Additional robustness checks are reported in Supplementary Section S3. We show that our results are not artifacts of pooling the data from both study sites by showing country-specific models using the non-standardized outcomes (Table S7 to Table S9). Our results for Bangladesh are robust to using a binary specification of the risk measure estimated using probit regression models showing that the clustering of observations at the extremes is not driving the results in the pooled analysis (Table S12, model 3). We use different models to account for censoring of measures at the extremes of our scales of risk attitudes and place attachment (Table S11), use appropriate models that account for the fact that most of our outcomes variables are not continuous (Table S12), and use seemingly unrelated regressions (SURE) to account for the correlation between the two dimensions of place attachment (Table S10). Lastly, we look at heterogeneous effects across hazard groups depending on preferences (Table S16 & Table S17) and the distance of communities to the next urban center (Table S18).

4 Discussion and Conclusions

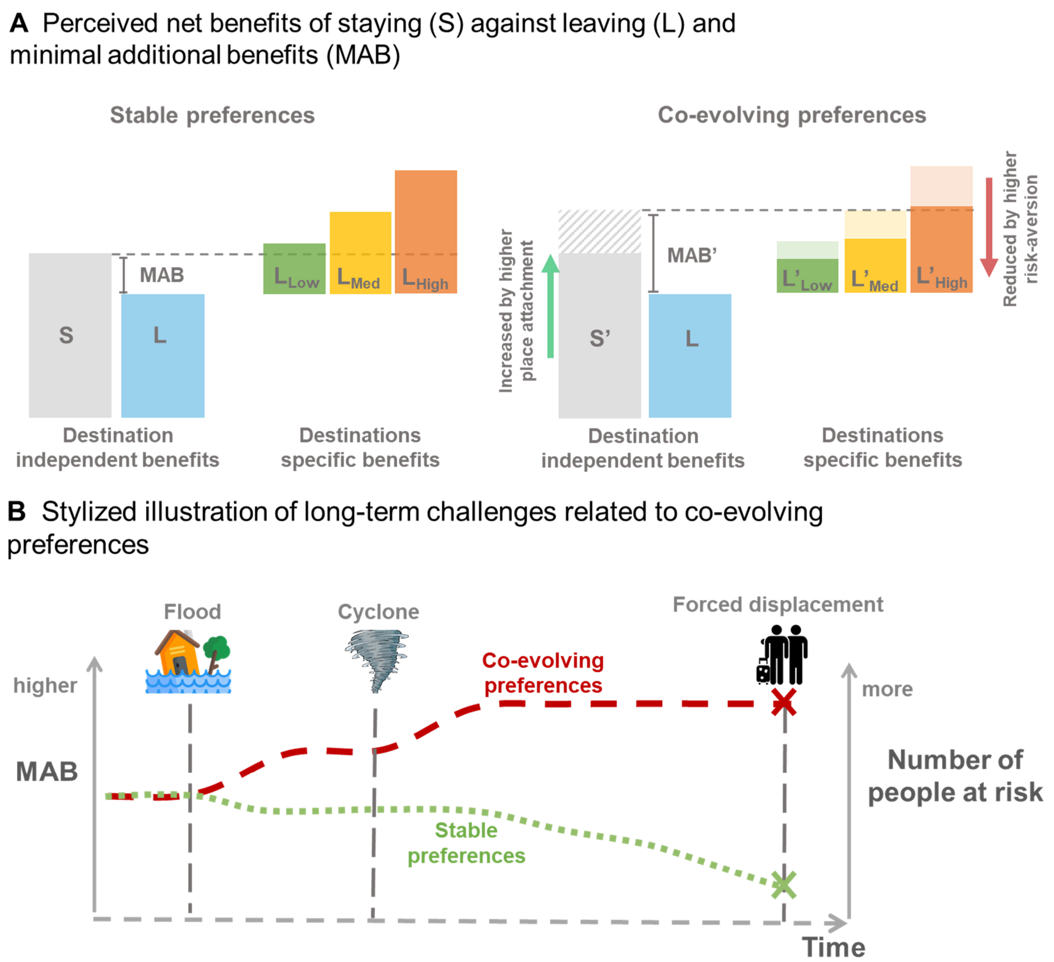
An increasing number of case studies on climate mobility have highlighted that it is important to understand the reasons why people - voluntary or involuntary - stay in hazardous areas (Adams, 2016; Esteban et al., 2019; Laurice Jamero et al., 2017). Changes in fundamental preferences (Becchetti et al., 2017; Beine et al., 2020; Cameron and Shah, 2015; Cassar et al., 2017) and migration intentions (Adger et al., 2021; Bekaert et al., 2021; Bertoli et al., 2020) in response to climate change are increasingly studied, however, to the best of our knowledge no studies combine these two strands of the literature to understand how changing risk preferences and place attachment affect (im-)mobility. One fundamental economic preference is the attitude towards risk which affects many important life decisions. In this study, we find that people who reported exposure to more climate-related hazards tend to be more risk-averse (Fig. 3) which looked at in isolation may already be worrying. Poverty has been associated with risk-averse decision-making, perpetuating poverty (see Haushofer & Fehr, 2014 for a review). Risk-averse farmers are less likely to adopt new technologies or diversify their incomes (Alemayehu et al., 2018), potentially further solidifying their state of poverty (Liu and

Huang, 2013). Likewise, we find that respondents who are more risk-averse are less likely to aspire to move abroad (Fig. 4, panel a). In addition, place identity, a central component for why people persist in hazardous environments (Adams, 2016), seems to be higher for respondents who experienced more climate-related hazards. Again, this result in isolation may already be worrying as it might prolong the time people remain in hazardous environments. Yet, for the most affected respondents in our sample, this increase in place identity seems to be associated with a higher likelihood to have an aspiration to move to a high-income destination (Fig. 4, panel b). While aspiring below one's actual potential has been called a potential cause for poverty traps (Appadurai, 2004; Banerjee et al., 2006, pp. 409–421), less is known about the effects of aspiring beyond one's potential. Evidence shows that people with unrealistic life goals in terms of education or income tend to be rather demotivated to work towards their goals and are unlikely to reach them (Genicot and Ray, 2017; Ross, 2019). Given that most respondents could not afford to move to high-income destinations, having these unrealistic aspirations might lead them to neglect closer and more affordable migration destinations.

Our results suggest that the experiences of floods or droughts can directly affect people's preferences and aspirations. With increasing experiences of hazards, in our sample of three or more events, preferences start to explain variation in migration aspirations. Higher place identity correlates with the aspirations to move to high-income countries while risk aversion is associated with lower aspirations to move at all. This interplay of preferences and migration aspirations is illustrated schematically in Fig. 5 to illustrate potential pathways of societal resilience to an increasing number of extreme events. In essence, we assume people to form migration aspirations based on their subjective comparison of perceived net benefits from staying against perceived net benefits from leaving (panel a). While staying in a hazardous environment comes at the risk of suffering from climate hazards, people also derive benefits from staying, such as their attachment to place, established social networks, the comfort of the familiar, as well as other intangible values. Thus, the perceived net benefits we refer to include the sum of all costs and benefits relevant to the individual. Leaving a hazardous area comes with the benefit of being less exposed to adverse events as well as benefits derived from living at the new destination, e.g., higher wages or access to better education and healthcare. While moving to a high-income country might be associated with higher benefits overall, the likelihood of success, e.g., being permitted and finding a permanent job, is much lower than in low- or middle-income countries. In our schematic representation, people will only form aspirations to migrate if their perceived net benefits of leaving are higher than their perceived net benefits of staying. We illustrate this in Fig. 5, panel a ("stable preferences"), where the destination-specific net benefits of low-, middle-, and high-income would all exceed the minimal additional benefits necessary (MAB) to form an aspiration to move, indicated by the horizontal dashed-line. All illustrated benefits are purely exemplary to illustrate how co-evolving preferences might affect aspirations to move abroad. Stable preferences relate to the theoretical assumption, often made in economics, that preferences are independent of hazard and changes in behavior are only explained by changes in budget constraints.

In Fig. 5, panel a ("co-evolving preferences"), we introduce the preference shift we observe in our data, where higher place attachment and risk aversion are associated with accumulative exposure to climate-induced hazards. First, we speculate that stronger place attachment will increase the perceived benefits of staying as the bonds to the place and people are now perceived to be more important. Thus, all else equal, an increase in place attachment would widen the wedge between perceived net benefits of staying and perceived net benefits of leaving in comparison to stable preferences, as indicated by an increase in the minimal additional benefit (MAB'). Consequently, people would be more likely to consider places where the perceived benefits are large enough to exceed the wedge created by the change in preferences. This might explain our finding in Fig. 4b that for respondents who report having experienced multiple hazards, place identity is associated with an increase in aspiring to move to a high-income destination. Second, respondents who experienced climate-induced hazards reported a higher risk aversion. In our representation, an increase in risk aversion would lower the perceived benefits of all risky outcomes. Given that moving abroad is perceived to be risky, the destination-specific benefits would decrease (L'_{Low}, L'_{Med}, L'_{High}), and people would be less likely to form aspirations with potentially only high-income destinations exceeding the required MAB' (see our results in Fig. 4a).

Fig. 5. Stylized impact of co-evolving preferences on migration aspirations and long-term implications



Notes: Panel A illustrates the interaction of destination independent and dependent benefits of staying and leaving, assuming either stable or co-evolving preferences. Panel B shows the potential long-term implications of co-evolving preferences in terms of the minimal additional benefits that people would require to consider leaving and the total number of people staying in hazardous areas including the resulting risk of forced displacement by gradual climate impacts.

The importance of our study can be seen when extrapolating our findings and the above representation in the future (Fig. 5, panel b). Over time, and in line with the latest projections, people will be increasingly exposed to climate-induced hazards. Assuming preferences are stable (green dotted line) only the destination independent benefits (L) of leaving a risky environment would increase. In our representation, this would imply a decrease in the minimal additional benefits (MAB) people require before aspiring to move. However, when people are continuously exposed to natural disasters and preferences are not stable but co-evolve, indicated by the red dashed line, risk-aversion and place attachment could increase with experiencing floods or storm surges and thus further increase the MAB required for leaving. Potentially, this might result in a high number of people being at risk of displacement.

Thus, co-evolving preferences might prolong the time people remain in hazardous places where they are increasingly exposed to immediate impacts by climate-related hazards and gradual impacts, accelerating the risk for socioeconomically marginalized households to eventually lose their ability to move abroad. Those who do not form aspirations to move abroad might still have to adapt by carrying out small movements to other risky, low-productive close-by locations once the place they live at becomes uninhabitable. There is now a strong need for developing anticipatory governance regimes to identify affected communities at risk of (further) falling into poverty and being exposed to an increasing number of climate-related hazards. As feelings of identification with the community are central to the decision to stay or leave, any resettlement plan should be designed as a participatory process. As people might reject relocation unless the perceived destination-specific benefits are sufficiently large, it is important to offer decent housing, good job opportunities, and public services at the new destination, as well as emphasizing the benefits of leaving the hazardous environment to enhance participation.

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Ethics statement: The study design and field implementation were designed and conducted according to the ethical standards in the declaration of Helsinki ("World Medical Association Declaration of Helsinki," 2013). All respondents gave their informed consent in written form and were free to resign from the study at any time.

Supplementary Information for: Why do people persist in sea-level rise threatened coastal regions? Empirical evidence on risk aversion and place attachment

The supplementary materials are organized as follows: Section S1 provides summary statistics, balancing across groups and information on affectedness across groups. Section S2 shows how respondents perceive past and future climate change impacts and their recommendation on how best to adapt to rising sea-levels. Section S3 provides the complete regression tables behind the graphical visualizations, model extensions, and robustness checks. In section S4, the reader can find additional information on migration aspirations and a descriptive analysis of the financial feasibility to act on these aspirations.

Table of Contents: Supplementary Information

Supplementary Figures:

Supplementary Tables:

S1 Summary statistics, descriptive results, affectedness, and balancing across groups

Supplementary Table S1 gives an overview of the different outcome variables and non-standardized independent variables used in the analysis presented in the main manuscript. Table S2 shows the self-reported damages by hazards and perceived risks of SLR across the three groups, while Table S3 shows the balancing of socioeconomic variables between the groups.

Table S1. Summary statistics

Panel A: Outcomes	N	Mean	SD	Min	Max
Preferences					
Stair-case Risk: Bangladesh	247	24.18	12.67	1	32
Investment Task: Vietnam	377	10,068.97	7,635.34	0	20000
Place identity (6, 30)	624	26.46	3.99	8	30
Place dependence (6, 30)	624	22.56	4.46	7	30
Migration Aspirations					
No aspiration (=1)	623	0.38	0.49	0	1
Low-income destination (=1)	623	0.04	0.20	0	1
Medium-income destination (=1)	623	0.16	0.36	0	1
High-income destination (=1)	623	0.42	0.49	0	1
Migration likelihood (very unlikely)	385	0.71	0.45	0	1
Migration likelihood (neither unlikely nor likely)	385	0.22	0.42	0	1
Migration likelihood (very likely)	385	0.06	0.25	0	1
Panel B: Explanatory variables					
Affectedness					
Number of droughts, floods & storms in the last 5 years	624	2.73	3.44	0	40
Damages & perceived threat					
Number of times rebuild house	624	0.88	2.28	0	15
Rebuild days	624	11.39	43.66	0	730
Rebuild costs (PPP adjusted)	617	1,464.70	4,623.37	0	43085
Relocation due to floods or land erosion in the past 10 years (=1)	624	0.38	0.48	0	1
Having lost land (=1)	624	0.22	0.41	0	1
Perceived threat of SLR for livelihoods	624	7.37	3.01	0	10
Perceived threat of SLR for relocation	624	3.67	3.50	0	10
Perceived intensity of future SLR impacts	624	3.84	1.05	1	5
Socio-economics					
Female(=1)	624	0.55	0.50	0	1
Age	624	40.79	14.25	18	92
Education (years)	624	6.83	4.43	0	18
Household size	624	4.42	1.64	1	12
Married(=1)	624	0.79	0.41	0	1
Value assets (PPP adjusted)	613	39,159.81	96,312.16	0	1470736
Monthly household income (PPP adjusted)	622	1,224.85	2,945.04	0	53856

Notes: All cost, income and asset value data has been PPP adjusted using conversion factors from the time of data collection.

Table S2. Affectedness across self-reported hazards

	None (1)	1 or 2 (2)	3 or more (3)	T-test differences	
Variable	Mean/SD	Mean/SD	Mean/SD	(1)-(2)	(1)-(3)
House: Rebuild frequency due to disasters	0.61	1.00	0.90	-0.40*	-0.29
	[1.62]	[2.49]	[2.31]		
House: Rebuild days after disaster	8.03	12.80	12.53	-4.77	-4.50
	[32.89]	[33.88]	[56.15]		
House: Rebuild costs after disaster	786.20	2250.52	1267.54	-1464.33***	-481.34
	[2752.03]	[6297.64]	[3827.87]		
Relocate due to disaster (=1)	0.27	0.50	0.57	-0.23***	-0.31***
	[0.44]	[0.50]	[0.50]		
Lost land to erosion (=1)	0.23	0.19	0.24	0.03	-0.01
	[0.42]	[0.40]	[0.43]		
Perceived threat to livelihoods due to disasters	6.51	6.95	8.33	-0.44	-1.83***
	[3.42]	[2.90]	[2.49]		
Perceived relocation risk due to disasters	2.71	3.55	4.47	-0.84**	-1.76***
	[3.19]	[3.50]	[3.53]		
Future perception of SLR impacts	3.72	3.73	4.02	-0.01	-0.30***
	[1.04]	[1.07]	[1.03]		
Observations	171	211	242		
F-test of joint significance (F-stat)				4.70***	11.74***
F-test, number of observations				377	410

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table S3. Balancing across self-reported hazards

	None (1)	1 or 2 (2)	3 or more (3)	T-test differences	
Variable	Mean/SD	Mean/SD	Mean/SD	(1)-(2)	(1)-(3)
Female	0.50	0.57	0.57	-0.07	-0.06
	[0.50]	[0.50]	[0.50]		
Age(years)	40.49	40.32	41.41	0.17	-0.92
	[14.00]	[14.71]	[14.05]		
Education (years)	6.91	6.35	7.21	0.57	-0.29
	[4.56]	[4.37]	[4.37]		
Household size	4.50	4.61	4.19	-0.11	0.31*
	[1.75]	[1.52]	[1.65]		
Married	0.83	0.76	0.79	0.07*	0.05
	[0.38]	[0.43]	[0.41]		
Monthly HH income(PPP)	931.95	1267.36	1394.24	-335.41	-462.29**
	[1100.61]	[4217.79]	[2435.56]		
Value assets (PPP)	38572.65	39406.14	39353.68	-833.49	-781.03
	[68212.22]	[125875.66]	[83190.64]		
Observations	171	206	242		
F-test (F-stat)				1.17	2.33**
F-test (obs)				371	405

Notes: *** p<0.01, ** p<0.05, * p<0.1

Table S4. Determinants of number of self-reported hazards

VARIABLES	Number of reported hazards (1)
Female	0.18
	(0.30)
Age(years)	0.01
	(0.01)
Education (years)	-0.01
	(0.03)
Household size	-0.24
	(0.36)
Married	-0.04
	(0.08)
Monthly HH income (PPP)	0.48***
	(0.12)
Value assets (PPP)	0.02
	(0.07)
Constant	-0.54
	(1.02)
Observations	611
Adjusted R-squared	0.01

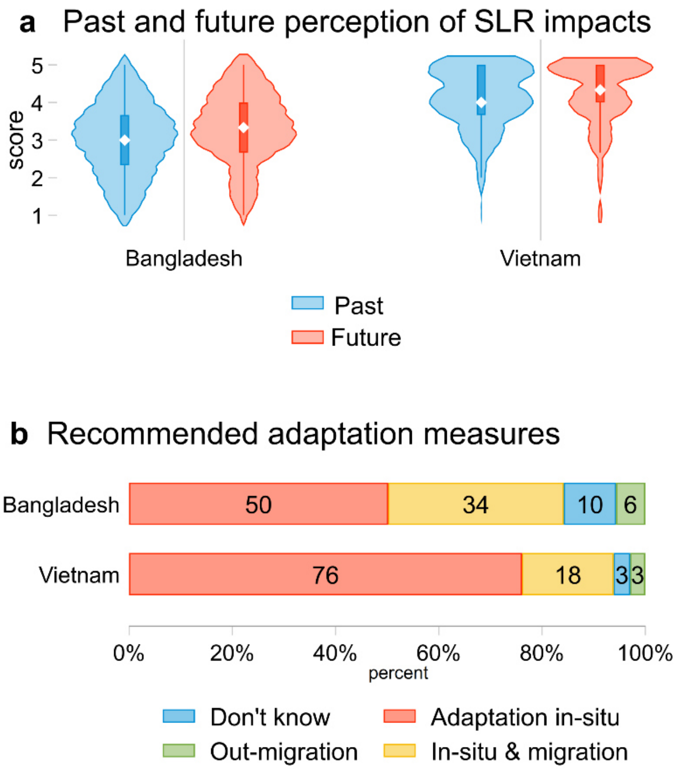
Notes: *** p<0.01, ** p<0.05, * p<0.1

S2 Impact- and risk appraisal of SLR hazards and adaptation strategies

We find evidence that respondents are indeed highly aware of sea-level rise impacts (higher, salinization and erosion) and that these will become worse in the future (paired T-test n=624, diff. (past-future)=-0.21, p=0.00) (Figure S1, panel **a**). Respondents in Bangladesh perceive SLR impacts as less likely to happen compared to respondents in Vietnam (Mann-Whitney U-Test, z=-11.17, p=0.00). On average, respondents in Bangladesh and Vietnam perceive that floods and erosion will be a severe threat to their livelihoods ($Mean_{Bangladesh}$=7.01±2.80, $Mean_{Vietnam}$=7.60±3.12). 11% (n=70) of respondents already believe it is "absolutely certain" that they will have to move permanently to a different place because of these impacts.

We derive adaptation responses from a hypothetical scenario of a two-foot (61 cm) rise in sea-level within the next five years (Figure S1, panel **b**). We explicitly asked respondents what they would recommend to others not what they would do themselves. This allows us to avoid biases related to self-reported behavioral intentions and enables respondents to express their preferences for different adaptation measures without being affected by their personal (lack of) capacities. In line with other studies, we find that most people would recommend in-situ adaptation to SLR despite respondents being aware of the potential impacts and risks. Mobility is predominantly seen as a last resort if all other adaptation measures fail. Overall, there seems to be a strong preference for known collective in-situ adaptation measures, the majority with 66% (n=411) recommends these measures, ranging between 50% in Bangladesh and 76% in Vietnam. The most preferred in-situ adaptation measures are by far sea-walls, named by 69% of respondents, followed by planting mangroves (50%), moving within the community boundaries (32%) and beach nourishment measures that try to counteract erosion (24%). The second most mentioned strategy with 24% of respondents is a combination of both in-situ adaptation as long as possible before moving away. Given that SLR impacts accumulate slowly over the years, these measures might be perceived as sufficient for now, leading people to overestimate their efficacy in dealing with them. Only 4% of respondents see migration as the only option to adapt and 6% of respondents would not know what to do at all.

Figure S1. Perceived climate impacts and recommended adaptation actions



Notes*:* The white diamond indicates the median; the blue box shows the interquartile range (middle 50% of values) and the light blue area shows the rotated and smoothed density plot. Panel **a** shows the distribution of the past and future SLR impact appraisal index (1 to 5). Higher values imply stronger agreement that sea levels are or will be higher, saltwater intrusion and coastal erosion already happened or will happen. Panel **b** shows the results from an open-ended question where respondents could give multiple answers based on which respondents were classified into four distinct categories: (i) people who didn't mention any measures, (ii) only in-situ adaptation measures; (iii) only out-migration and (iv) a combination of in-situ adaptation and out-migration. We asked respondents what they would recommend to people living in low-lying coastal areas or atolls to do to prepare themselves. "Suppose sea levels will increase by 1/2 meter within the next five years. This would mean that waves become much stronger, more land will be lost to the sea, and saltwater will come further into the land on high tides."

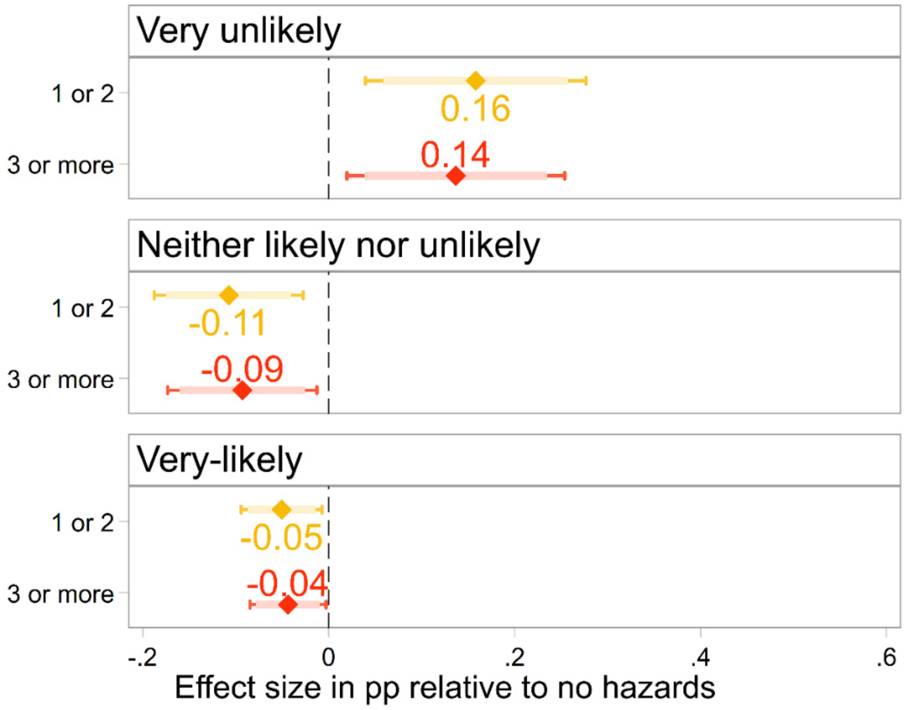
S3 Additional analysis and robustness checks

S3.1 Migration likelihood in the next three years

We study migration in a sample where people are (i) highly affected by hazards related to rising sea-levels and (ii) many desire to move internationally but have low ability to act on these aspirations potentially worsened by climate hazards. Overall, 71% of respondents with an aspiration assessed it as “very unlikely” (n=274), while only 6% are optimistic (n=25) to move abroad. The other 22% (n=86) perceive their chances as neither “very likely” nor “very unlikely”. Indeed, when predicting the migration likelihood, we find that number of reported climate hazards are associated with a lower likelihood to act on aspirations to move abroad within the next three years (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). In the Supplementary Section S4 we already further investigated respondent’s financial ability to act on their aspirations. This descriptive analysis revealed that only three respondents who assessed their likelihood as “very likely” could move to their desired destination (South Africa, Australia, Thailand) given their financial ability.

Thus, while climate hazards are associated with aspiring to move abroad, they are negatively correlated with the likelihood to act on these aspirations. This could be in line with our proposed conceptual model where people are more likely to form aspirations beyond their capacities (high-income destinations) with increasing hazards neglecting less attractive alternatives, which may ultimately result in more people staying in hazardous environments.

Figure S2. Predicted migration likelihood in the next three years



Notes: Predicted estimates from an ordered logistic regression of reported hazards on the likelihood to act on their migration aspirations within the next three years. In all models we include village fixed effects and control for socio-economics and damages. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

S3.2 Robustness checks of main results

In the following we provide the full regression outputs underlying the results presented in the figures showing estimates for all control variables (Table S5 & Table S6). In addition, we provide several robustness checks that raise our confidence regarding the findings shown in the main manuscript:

- Country specific analysis yield similar results, even when controlling for interviewer fixed effects (Table S7 to Table S9)
- Binary specification of risk aversion due to clustering at the extremes yields similar results in Bangladesh (Table S12)
- Results for place attachment are robust when accounting for the correlation between both place attachment dimensions using SURE models (Table S12)
- Results on risk attitudes and place attachment are robust when using tobit models to account for censoring of the data (Table S11) and the count structure of the data (Table S12)
- Results are also robust when using a binary explanatory variable of reported hazards Table S13 or aggregate measure (Table S14) and when excluding respondents who moved recently to the village where we interviewed them, as these might have had less time to experience hazards at this place (Table S15).

Table S5. Full regression output for preferences (Figure 3, panel a)

	Risk (z-score)		Identity (z-score)		Dependance (z-score)	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Hazards: 1 or 2	0.14	0.20*	0.22**	0.19*	0.30***	0.26**
	(0.11)	(0.11)	(0.11)	(0.11)	(0.10)	(0.10)
Hazards: 3 or more	0.17*	0.23**	0.31***	0.29***	0.05	0.06
	(0.10)	(0.10)	(0.11)	(0.11)	(0.10)	(0.11)
Socio-economics						
Female (=1)		0.12		-0.12		-0.04
		(0.08)		(0.09)		(0.09)
Age (years)		0.01**		0.01		0.01***
		(0.00)		(0.00)		(0.00)
Married (=1)		-0.09		-0.10		0.25**
		(0.10)		(0.11)		(0.12)
Education		-0.00		0.01		-0.01
		(0.01)		(0.01)		(0.01)
Household size		-0.07		0.05		-0.03
		(0.05)		(0.05)		(0.05)
HH monthly income (log+1)		0.01		-0.01		-0.02
		(0.03)		(0.03)		(0.03)
HH asset value (log+1)		-0.01		0.03		0.05*
		(0.03)		(0.02)		(0.03)
Damages by hazards						
Land lost erosion (=1)		-0.07		0.04		-0.15
		(0.11)		(0.10)		(0.12)
House rebuild index (PCA)		-0.06**		0.01		0.00
		(0.03)		(0.03)		(0.03)
Constant	0.28	0.44	-0.15	-0.58	-0.02	-0.31
	(0.18)	(0.38)	(0.13)	(0.44)	(0.16)	(0.42)
Village FE	Y	Y	Y	Y	Y	Y
Observations	624	605	624	605	624	605
Adjusted / Pseudo R-squared	0.09	0.10	0.02	0.01	0.02	0.06
F-test: Socio-economics		0.09		0.22		0.00
F-test: Damages		0.05		0.85		0.43

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S6. Multinomial logit with no aspiration as the reference group (Figure 3, panel b)

VARIABLES	(1) No_aspiration (refreference group)	(2) Low income	(3) Medium income	(4) High income
Hazards: 1 or 2		1.26**	0.92**	0.37
		(0.60)	(0.43)	(0.29)
Hazards: 3 or more		0.71	1.68***	0.98***
		(0.67)	(0.46)	(0.29)
Socio-economics				
Female (=1)		1.10*	0.30	0.27
		(0.64)	(0.37)	(0.22)
Age (years)		-0.01	-0.02	-0.02*
		(0.02)	(0.02)	(0.01)
Married (=1)		-0.68	-0.64	0.11
		(0.78)	(0.48)	(0.27)
Education		0.01	-0.05	0.08**
		(0.07)	(0.05)	(0.03)
Household size		-0.11	-0.25**	-0.05
		(0.14)	(0.12)	(0.09)
HH monthly income (log+1)		0.61**	0.51***	0.50***
		(0.28)	(0.18)	(0.17)
HH asset value (log+1)		0.25	-0.09	0.11
		(0.19)	(0.12)	(0.09)
Damages by hazards				
Land lost erosion (=1)		-0.08	0.43	-0.23
		(0.66)	(0.44)	(0.31)
House rebuild index (PCA)		-0.16	-0.10	0.03
		(0.17)	(0.12)	(0.08)
Constant		-5.14**	1.11	-2.38*
		(2.33)	(1.57)	(1.36)
Village FE		Y	Y	Y
Observations	605	605	605	605
Pseudo-squared	0.33	0.33	0.33	0.33

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S7. Additional regressions: Risk preferences

	Pooled Risk (z-score)			Bangladesh Staircase (1, 32)	Vietnam Amount (in VND) invested in the risky lottery (0, 20000)
VARIABLES	(1)	(2)	(3)	(4)	(5)
Hazards: 1 or 2	0.14	0.21**	0.27**	3.94*	-2,155.62
	(0.11)	(0.11)	(0.12)	(2.19)	(1,361.03)
Hazards: 3 or more	0.17*	0.24**	0.45***	4.45**	-4,491.38***
	(0.10)	(0.10)	(0.12)	(2.26)	(1,403.17)
Socio-economics					
Female (=1)		0.14	0.10	0.10	-1,350.23
		(0.09)	(0.09)	(2.11)	(852.59)
Age (31-40)		0.17	0.21*	0.95	-2,933.32**
		(0.12)	(0.11)	(2.15)	(1,324.71)
Age (41-50)		0.14	0.15	1.45	-2,115.27
		(0.13)	(0.13)	(2.65)	(1,473.77)
Age (51-60)		0.46***	0.47***	3.39	-4,944.02***
		(0.15)	(0.15)	(3.63)	(1,548.15)
Age (>60)		0.27*	0.22	-1.72	-2,905.73*
		(0.16)	(0.16)	(6.38)	(1,599.38)
Married (=1)		-0.11	-0.16	-1.40	1,155.00
		(0.10)	(0.11)	(2.46)	(1,062.52)
Education		-0.00	-0.01	-0.07	15.37
		(0.01)	(0.01)	(0.22)	(122.39)
Household size		-0.02	-0.01	-0.83	-468.38
		(0.03)	(0.03)	(0.51)	(294.55)
HH monthly income (log+1)		-0.07	-0.02	0.44	650.07
		(0.05)	(0.05)	(0.83)	(698.62)
HH asset value (log+1)		0.01	0.02	0.15	-195.73
		(0.03)	(0.03)	(0.54)	(265.47)
Damages extremes					
Land lost erosion (=1)		-0.07	-0.06	-2.63	-1,060.43
		(0.11)	(0.11)	(1.90)	(1,250.94)
House rebuild index (PCA)		-0.06**	-0.06**	-1.09*	395.95
		(0.03)	(0.03)	(0.61)	(341.25)
Constant	0.28	0.62*	-0.16	21.00***	14,905.82***
	(0.18)	(0.36)	(0.42)	(7.93)	(4,760.43)
Village FE	Y	Y	Y	Y	Y
Interviewer FE	N	N	Y	Y	Y
Observations	624	605	604	247	357
Adjusted R-squared	0.09	0.10	0.14	0.05	0.08

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S8. Additional regressions: Place identity (z-score)

VARIABLES	(1)	Pooled (2)	(3)	Bangladesh (4)	Vietnam (5)
Hazards: 1 or 2	0.22**	0.20*	0.12	0.00	0.45**
	(0.11)	(0.11)	(0.12)	(0.13)	(0.17)
Hazards: 3 or more	0.31***	0.29***	0.19	-0.04	0.60***
	(0.11)	(0.11)	(0.12)	(0.14)	(0.17)
Socio-economics					
Female (=1)		-0.13	-0.08	-0.31***	0.00
		(0.09)	(0.08)	(0.12)	(0.12)
Age (31-40)		0.00	-0.02	-0.13	0.11
		(0.12)	(0.11)	(0.15)	(0.19)
Age (41-50)		0.25**	0.14	0.05	0.41**
		(0.12)	(0.12)	(0.15)	(0.20)
Age (51-60)		0.05	0.04	-0.04	0.15
		(0.15)	(0.15)	(0.17)	(0.22)
Age (>60)		0.22	0.18	0.09	0.35
		(0.16)	(0.15)	(0.24)	(0.22)
Married (=1)		-0.09	0.04	0.12	-0.18
		(0.12)	(0.12)	(0.16)	(0.16)
Education		0.01	-0.01	0.01	0.00
		(0.01)	(0.01)	(0.01)	(0.02)
Household size		0.04	0.04	0.00	0.09**
		(0.02)	(0.02)	(0.03)	(0.04)
HH monthly income (log+1)		0.05	0.10*	0.01	0.10
		(0.05)	(0.05)	(0.06)	(0.09)
HH asset value (log+1)		-0.01	0.02	-0.00	-0.03
		(0.03)	(0.03)	(0.04)	(0.06)
Damages extremes					
Land lost erosion (=1)		0.05	-0.03	0.06	-0.01
		(0.10)	(0.09)	(0.12)	(0.16)
House rebuild index (PCA)		0.00	-0.02	-0.00	0.02
		(0.03)	(0.03)	(0.03)	(0.04)
Constant	-0.15	-0.45	-1.38***	0.09	-1.17
	(0.13)	(0.42)	(0.47)	(0.48)	(0.72)
Village FE	Y	Y	Y	Y	Y
Interviewer FE	N	N	Y	N	N
Observations	624	605	604	247	358
Adjusted R-squared	0.02	0.02	0.19	-0.02	0.04

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S9. Additional regressions: Place dependence (z-score)

	Pooled			Bangladesh	Vietnam
VARIABLES	(1)	(2)	(3)	(4)	(5)
Hazards: 1 or 2	0.30***	0.27**	0.15	0.21	0.42***
	(0.10)	(0.10)	(0.11)	(0.14)	(0.16)
Hazards: 3 or more	0.05	0.06	0.07	0.05	0.18
	(0.10)	(0.11)	(0.12)	(0.15)	(0.15)
Socio-economics					
Female (=1)		-0.04	-0.05	-0.05	-0.03
		(0.09)	(0.09)	(0.13)	(0.11)
Age (31-40)		0.05	0.04	-0.13	0.32*
		(0.12)	(0.11)	(0.15)	(0.19)
Age (41-50)		0.22	0.17	-0.03	0.52**
		(0.14)	(0.14)	(0.17)	(0.23)
Age (51-60)		0.26*	0.22	0.19	0.45**
		(0.15)	(0.15)	(0.23)	(0.22)
Age (>60)		0.46***	0.37**	0.75***	0.65***
		(0.17)	(0.17)	(0.26)	(0.23)
Married (=1)		0.29**	0.34***	0.13	0.33**
		(0.12)	(0.12)	(0.18)	(0.16)
Education		-0.01	-0.02**	-0.00	-0.02
		(0.01)	(0.01)	(0.02)	(0.02)
Household size		0.05**	0.04	-0.01	0.13***
		(0.03)	(0.03)	(0.03)	(0.04)
HH monthly income (log+1)		-0.03	0.03	-0.09	-0.01
		(0.05)	(0.06)	(0.07)	(0.08)
HH asset value (log+1)		-0.01	0.00	-0.02	-0.02
		(0.03)	(0.03)	(0.03)	(0.04)
Damages extremes					
Land lost erosion (=1)		-0.14	-0.12	0.04	-0.31*
		(0.12)	(0.11)	(0.15)	(0.18)
House rebuild index (PCA)		0.00	-0.02	-0.00	0.02
		(0.03)	(0.03)	(0.04)	(0.03)
Constant	-0.02	-0.10	-0.82*	0.72	-0.82
	(0.16)	(0.39)	(0.48)	(0.51)	(0.61)
Village FE	Y	Y	Y	Y	Y
Interviewer FE	N	N	Y	N	N
Observations	624	605	604	247	358
Adjusted R-squared	0.02	0.06	0.12	-0.02	0.11

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S10. SURE models place attachment

VARIABLES	Identity (1)	Dependence (2)
Hazards: 1 or 2	0.20*	0.27***
	(0.10)	(0.10)
Hazards: 3 or more	0.29***	0.06
	(0.10)	(0.10)
Socio-economics		
Female (=1)	-0.13	-0.04
	(0.09)	(0.08)
Age (31-40)	0.00	0.05
	(0.12)	(0.11)
Age (41-50)	0.25*	0.22*
	(0.13)	(0.13)
Age (51-60)	0.05	0.26*
	(0.15)	(0.15)
Age (>60)	0.22	0.46***
	(0.16)	(0.16)
Married (=1)	-0.09	0.29***
	(0.11)	(0.11)
Education	0.01	-0.01
	(0.01)	(0.01)
Household size	0.04	0.05**
	(0.03)	(0.03)
HH monthly income (log+1)	0.05	-0.03
	(0.05)	(0.05)
HH asset value (log+1)	-0.01	-0.01
	(0.03)	(0.03)
Damages extremes		
Land lost erosion (=1)	0.05	-0.14
	(0.11)	(0.11)
House rebuild index (PCA)	0.00	0.00
	(0.03)	(0.03)
Constant	-0.45	-0.10
	(0.38)	(0.37)
Observations	605	605
Adjusted R-squared	0.06	0.11

Notes: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S11. Tobit models: Accounting for censoring of measures

	Risk	Identity	Dependence
VARIABLES	(1)	(2)	(3)
Hazards: 1 or 2	0.31**	0.03	0.05**
	(0.15)	(0.03)	(0.02)
Hazards: 3 or more	0.54***	0.07**	0.01
	(0.16)	(0.03)	(0.02)
Socio-economics			
Female (=1)	0.07	-0.02	-0.01
	(0.10)	(0.02)	(0.02)
Age (31-40)	0.27*	-0.00	0.01
	(0.14)	(0.03)	(0.02)
Age (41-50)	0.18	0.07**	0.04
	(0.16)	(0.03)	(0.03)
Age (51-60)	0.53***	0.01	0.05*
	(0.18)	(0.04)	(0.03)
Age (>60)	0.25	0.04	0.09***
	(0.19)	(0.04)	(0.03)
Married (=1)	-0.14	-0.03	0.06**
	(0.12)	(0.03)	(0.02)
Education	-0.01	0.00	-0.00
	(0.01)	(0.00)	(0.00)
Household size	-0.01	0.01	0.01*
	(0.03)	(0.01)	(0.01)
HH monthly income (log+1)	-0.01	0.01	-0.01
	(0.07)	(0.01)	(0.01)
HH asset value (log+1)	0.02	-0.01	-0.00
	(0.03)	(0.01)	(0.01)
Damages extremes			
Land lost erosion (=1)	-0.06	0.00	-0.02
	(0.13)	(0.02)	(0.02)
House rebuild index (PCA)	-0.08**	0.00	0.00
	(0.04)	(0.01)	(0.01)
Constant	0.52	0.83***	0.66***
	(0.51)	(0.11)	(0.08)
Village FE	Y	Y	Y
Interviewer FE	Y	N	N
Observations	604	605	605
Pseudo R-squared	0.12	0.11	-0.43

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S12. Accounting for count structure of measures

	Bangladesh: Risk staircase			Vietnam: Amount invested in risky lottery		Pooled: Poisson	
	Poisson	Negative-binomial	Probit (AME): Risk-averse (=1)	Poisson	Negative-binomial	Place identity	Place dependence
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Hazards: 1 or 2	0.16*	0.18	0.12*	-0.22*	-0.25	0.04*	0.08**
	(0.09)	(0.11)	(0.07)	(0.13)	(0.17)	(0.02)	(0.03)
Hazards: 3 or more	0.19**	0.19*	0.15**	-0.47***	-0.54***	0.06***	0.02
	(0.09)	(0.12)	(0.07)	(0.14)	(0.19)	(0.02)	(0.03)
Socio-economics							
Female (=1)	0.01	0.04	-0.02	-0.14*	-0.15	-0.03	-0.01
	(0.08)	(0.11)	(0.06)	(0.08)	(0.11)	(0.02)	(0.02)
Age (31-40)	0.04	0.04	0.02	-0.28**	-0.38***	-0.00	0.01
	(0.09)	(0.11)	(0.06)	(0.12)	(0.14)	(0.03)	(0.03)
Age (41-50)	0.06	0.10	0.03	-0.21	-0.31*	0.05**	0.06
	(0.10)	(0.13)	(0.08)	(0.13)	(0.16)	(0.03)	(0.04)
Age (51-60)	0.14	0.12	0.12	-0.52***	-0.64***	0.01	0.08*
	(0.14)	(0.19)	(0.09)	(0.15)	(0.19)	(0.03)	(0.04)
Age (>60)	-0.06	0.02	-0.14	-0.29*	-0.40**	0.05	0.13***
	(0.23)	(0.25)	(0.23)	(0.15)	(0.19)	(0.03)	(0.05)
Married (=1)	-0.06	-0.12	-0.04	0.13	0.15	-0.02	0.09**
	(0.10)	(0.12)	(0.07)	(0.11)	(0.12)	(0.02)	(0.04)
Education	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Household size	-0.03	-0.04*	-0.03**	-0.05	-0.05	0.01	0.01**
	(0.02)	(0.03)	(0.01)	(0.03)	(0.04)	(0.01)	(0.01)
HH monthly income (log+1)	0.02	0.02	0.02	0.07	0.10	0.01	-0.01
	(0.03)	(0.04)	(0.03)	(0.07)	(0.08)	(0.01)	(0.01)
HH asset value (log+1)	0.00	0.01	0.00	-0.02	-0.03	-0.00	-0.00
	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)	(0.01)	(0.01)
Damages extremes							
Land lost erosion (=1)	-0.12	-0.14	-0.10*	-0.11	-0.11	0.01	-0.04
	(0.08)	(0.10)	(0.06)	(0.14)	(0.15)	(0.02)	(0.03)
House rebuild index (PCA)	-0.04*	-0.06*	-0.03*	0.05	0.04	0.00	0.00
	(0.02)	(0.03)	(0.02)	(0.04)	(0.04)	(0.01)	(0.01)
Constant	3.05***	3.12***		9.56***	9.48***	-0.28***	-0.42***
	(0.32)	(0.42)		(0.49)	(0.57)	(0.09)	(0.11)
Village FE	Y	Y	Y	Y	Y	Y	Y
Interviewer FE	Y	Y	Y	Y	Y	N	N
Observations	247	247	247	357	357	605	605
Pseudo R-Squared	0.07	0.01	0.14	0.12	0.00	0.00	0.00

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table S13. Binary specification of self-reported hazards variable (yes / no)

VARIABLES	Risk (z-score) (1)	Identity (z-score) (2)	Dependance (z-score) (3)	Aspiration to move abroad (=1) (4)
Climate related hazard (=1)	0.28***	0.23**	0.21**	0.09**
	(0.10)	(0.11)	(0.10)	(0.04)
Number of hazards	-0.02	0.00	-0.02	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Socio-economics				
Female (=1)	0.12	-0.12	-0.04	0.04
	(0.08)	(0.09)	(0.09)	(0.03)
Age (years)	0.01**	0.01	0.01***	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Married (=1)	-0.09	-0.10	0.24**	0.01
	(0.10)	(0.11)	(0.12)	(0.04)
Education	-0.00	0.01	-0.02	0.01**
	(0.01)	(0.01)	(0.01)	(0.00)
Household size	-0.06	0.06	-0.04	0.08***
	(0.05)	(0.05)	(0.05)	(0.02)
HH monthly income (log+1)	0.01	-0.01	-0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.01)
HH asset value (log+1)	-0.01	0.03	0.05**	-0.02
	(0.03)	(0.02)	(0.03)	(0.01)
Damages extremes				
Land lost erosion (=1)	-0.06	0.05	-0.16	-0.01
	(0.11)	(0.10)	(0.12)	(0.05)
House rebuild index (PCA)	-0.06**	0.01	0.01	-0.00
	(0.03)	(0.03)	(0.03)	(0.01)
Constant	0.41	-0.60	-0.28	
	(0.38)	(0.44)	(0.42)	
Village FE	Y	Y	Y	Y
Observations	605	605	605	605
Adjusted R-squared	0.10	0.01	0.06	
Pseudo R-Squared				0.27

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

As a robustness check, we aggregate self-reported data at the community level, which is a well-established method when the outcome of interest is also at the community level (Sampson et al., 1997). Hunter et al. (2013) showed that aggregated self-reported measures of drought were strongly associated with objective measures of rainfall in Australia. Similarly, Edwards et al. (2020) finds among a Filipino sample that aggregated disaster exposure also correlated well with disaster exposure using EM-DAT data.

We generate an individual-specific average exposure to climate hazards based on other participants reports of hazards in the same community but not individual self-reports.

$$(1) \quad \text{aggregate\_hazards}_i = \frac{\sum_{j \neq i} \text{number\_hazards} - \text{number\_hazards}_i}{N_{\text{community}} - 1}$$

On average, there is positive relationship between aggregate measure and individual self-reports of climate hazards (Pearson correlation r=0.14, p=0.00), indicating the idiosyncratic nature of hazards as not all shocks affect the entire community in the same way. Thus, most of the variation in reported climate hazards occurs within communities not between them. Our results for risk are robust to using the aggregate measure, while the association with place identity and dependence is not. However, this analysis is also less than ideal for two reasons. First, the aggregate measure in this analysis assigns respondents who did report to have not experienced any hazards in the past five years on average with 2.6 hazards. Second, the interpretation of the model is different as we cannot net out common shocks at the community level through the inclusion of village fixed effects with the aggregate measure. While individual reports of climate hazards are prone to outliers, the aggregate measure takes most of the variation in hazards within villages away. We think the grouping of reported hazards offers the best compromise to understand individual responses (risk aversion, place attachment, aspirations) by allowing individual variation in reported hazards (from none to 3 or more) within communities while also rigorously constraining outliers.

Table S14. Preferences robustness check with aggregate measure of hazards

VARIABLES	Risk aversion (1)	Place identity (2)	Place dependence (3)
Aggregate hazards	0.11**	0.01	0.01
	(0.05)	(0.07)	(0.05)
Socio-economics			
Female (=1)	0.14*	-0.07	-0.02
	(0.08)	(0.09)	(0.09)
Age (years)	0.01**	0.01**	0.01**
	(0.00)	(0.00)	(0.00)
Married (=1)	-0.11	-0.12	0.23
	(0.11)	(0.10)	(0.15)
Education	-0.00	0.01	-0.01
	(0.01)	(0.01)	(0.01)
Household size	-0.01	0.03	0.06*
	(0.04)	(0.02)	(0.03)
HH monthly income (log+1)	-0.06	0.07	-0.03
	(0.05)	(0.06)	(0.05)
HH asset value (log+1)	0.00	-0.01	-0.02
	(0.02)	(0.03)	(0.03)
Damages extremes			
Land lost erosion (=1)	-0.06	0.02	-0.15
	(0.10)	(0.08)	(0.15)
House rebuild index (PCA)	-0.05**	0.03**	0.01
	(0.02)	(0.01)	(0.03)
Vietnam (=1)	-0.74***	-0.13	-0.25*
	(0.09)	(0.16)	(0.14)
Constant	0.32	-0.59	-0.24
	(0.36)	(0.60)	(0.52)
Cluster	16	16	16
Observations	605	605	605
Adjusted R-squared	0.10	0.00	0.06

Notes: Standard errors are clustered at the community level and bootstrapped with 500 replications to account for few clusters: *** p<0.01, ** p<0.05, * p<0.1

Table S15. Excluding all migrants in our sample

VARIABLES	Risk (z-score) (1)	Identity (z-score) (2)	Dependance (z-score) (3)	Aspiration to move abroad (=1) (4)
Hazards: 1 or 2	0.19	0.10	0.15	0.09*
	(0.13)	(0.11)	(0.12)	(0.05)
Hazards: 3 or more	0.25**	0.32***	0.05	0.22***
	(0.12)	(0.11)	(0.12)	(0.05)
Socio-economics				
Female (=1)	0.11	0.02	-0.02	0.03
	(0.10)	(0.09)	(0.10)	(0.04)
Age (years)	0.01***	0.00	0.01**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Married (=1)	-0.23**	-0.02	0.28**	0.01
	(0.12)	(0.11)	(0.13)	(0.05)
Education	-0.00	0.00	-0.03**	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Household size	-0.05	0.03	-0.08	0.11***
	(0.05)	(0.05)	(0.05)	(0.03)
HH monthly income (log+1)	0.03	-0.00	0.02	0.02
	(0.03)	(0.04)	(0.03)	(0.01)
HH asset value (log+1)	-0.03	-0.01	0.05*	-0.02
	(0.03)	(0.02)	(0.03)	(0.01)
Damages extremes				
Land lost erosion (=1)	-0.08	-0.06	-0.30**	-0.07
	(0.13)	(0.10)	(0.13)	(0.05)
House rebuild index (PCA)	-0.04	-0.04	-0.01	-0.00
	(0.04)	(0.03)	(0.03)	(0.01)
Constant	0.24	-0.20	-0.36	
	(0.42)	(0.43)	(0.44)	
Observations	433	433	433	433
Adjusted R-squared	0.12	0.01	0.10	
Pseudo R-Squared				0.32

Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

S3.3 Heterogeneous treatment effects

Table S16 shows the regression models underlying **Fehler! Verweisquelle konnte nicht gefunden werden.** reported in the main manuscript. Table S17 shows a related model using interaction terms using the pooled sample as a robustness check. Table S18 shows heterogeneous effects of reported climate hazards depending on how far respondents live from the next urban center.

Table S16. Determinants of migration aspirations across groups

	Aspiration to move abroad (=1)			Aspiration to move to high-income destination (=1)		
	None	**1 or 2**	**3+**	**None**	**1 or 2**	**3+**
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Risk aversion (z-score)	0.01	-0.03	-0.07**	0.02	0.01	-0.03
	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Identity (z-score)	0.02	-0.09**	0.04	0.05	-0.02	0.11***
	(0.04)	(0.04)	(0.03)	(0.05)	(0.05)	(0.03)
Dependence (z-score)	-0.03	0.06	-0.01	-0.05	-0.04	-0.06*
	(0.04)	(0.05)	(0.03)	(0.05)	(0.05)	(0.04)
Socio-economics						
Female (=1)	0.11*	0.03	0.02	-0.00	-0.01	0.10
	(0.06)	(0.06)	(0.06)	(0.08)	(0.07)	(0.06)
Age	-0.01**	-0.00	-0.00	-0.01**	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Married (=1)	0.02	-0.05	0.09	0.16	0.03	0.12
	(0.09)	(0.07)	(0.07)	(0.11)	(0.08)	(0.08)
Education	-0.01	0.01	0.01	-0.00	0.02*	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
HH monthly income (log+1)	0.08**	0.06*	0.07	0.07	0.03	0.07
	(0.03)	(0.03)	(0.04)	(0.05)	(0.05)	(0.05)
HH asset value (log+1)	0.00	0.02	0.04*	0.01	0.06**	0.05*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
Household size	-0.01	-0.03	-0.01	0.02	-0.01	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Damages						
Land lost erosion (=1)	0.06	-0.09	0.00	0.02	-0.19**	-0.07
	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)	(0.07)
House rebuild index (PCA)	-0.05**	-0.01	0.03*	0.01	0.01	0.02
	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Vietnam (=1)	-0.67***	-0.58***	-0.39***	-0.13	0.00	0.08
	(0.07)	(0.06)	(0.07)	(0.11)	(0.09)	(0.09)
Observations	164	203	238	164	202	238
Pseudo R-squared	0.38	0.30	0.20	0.10	0.10	0.16

Notes: Estimates are average marginal effects calculated after probit regressions. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

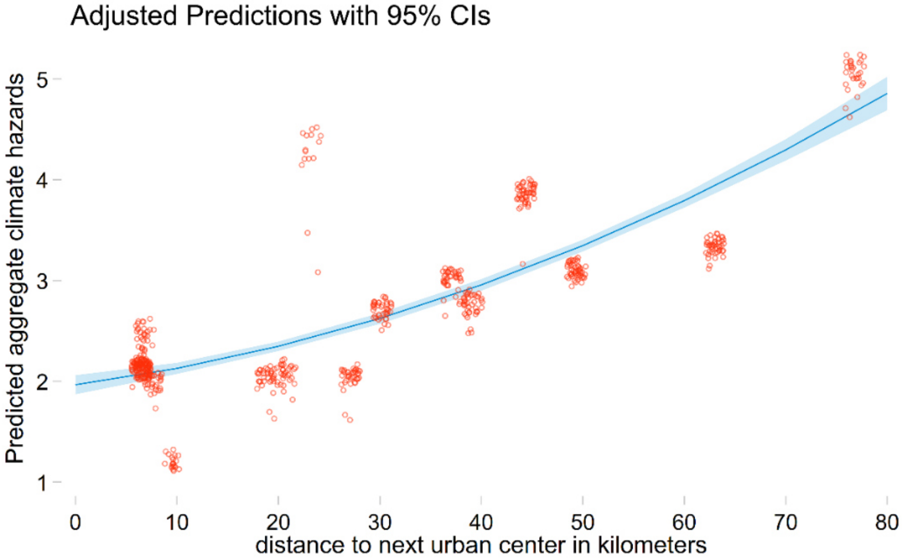
Table S17. Heterogeneous effects for migration aspirations depending on preferences

	Aspiration (=1)			High-income destination (=1)		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
1 or 2 extremes	0.10**	0.10**	0.10**	0.02	0.02	0.03
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
3 or more extremes	0.18***	0.17***	0.18***	0.09*	0.08	0.09*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Risk aversion	0.01	-0.03	-0.03	0.04	-0.00	-0.00
	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)
1 or 2 extremes * Risk aversion	-0.03			-0.03		
	(0.04)			(0.05)		
3 or more extremes * Risk aversion	-0.10**			-0.09*		
	(0.04)			(0.05)		
Place identity	0.01	0.02	0.01	0.06***	0.07	0.07***
	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)	(0.02)
1 or 2 extremes * Place identity		-0.06			-0.08	
		(0.05)			(0.05)	
3 or more extremes * Place identity		0.03			0.04	
		(0.04)			(0.05)	
Place dependence	-0.01	-0.00	-0.01	-0.06**	-0.05**	-0.05
	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)
1 or 2 extremes * Place dependence			-0.02			-0.06
			(0.05)			(0.05)
3 or more extremes * Place dependence			0.01			0.01
			(0.04)			(0.05)
Constant	0.39**	0.38**	0.39**	-0.31*	-0.32*	-0.31*
	(0.16)	(0.15)	(0.15)	(0.18)	(0.18)	(0.18)
Joint F-test interaction	0.00	0.00	0.00	0.19	0.02	0.25
Observations	605	605	605	604	604	604
R-squared	0.30	0.30	0.30	0.12	0.13	0.12
Adjusted R-squared	0.28	0.28	0.27	0.10	0.10	0.09

Notes: Controlling for socio-economics, damages and country-fixed effects. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

We find evidence that communities closer to urban centers tend to be less affected by climate hazards than more rural communities. The predicted relationship between aggregate community reports of climate hazards for a range of distances to the next urban center with more than 100,000 residents overlayed with a scatterplot of the underlying data (see Figure S3). The further a community is away from an urban center the more hazards are reported on aggregate by (Pearson correlation r=0.81, p=0.00). Using a median split shows that communities that are closer (below median distance to urban center of 27km) report on average only 2.1 hazards in the past five years while more rural communities report 3.2 (p=0.00).

Figure S3. Predicted relationship between climate hazards and distance to urban center



Notes: Marginsplot of predicted climate hazards for a range of distances to urban centers. The reported results from the regression model including the squared distance to urban centers yields slightly better model fit (adjusted R-squared = 0.68).

Table S18. Heterogeneous effects for migration aspirations depending on distance to urban centers

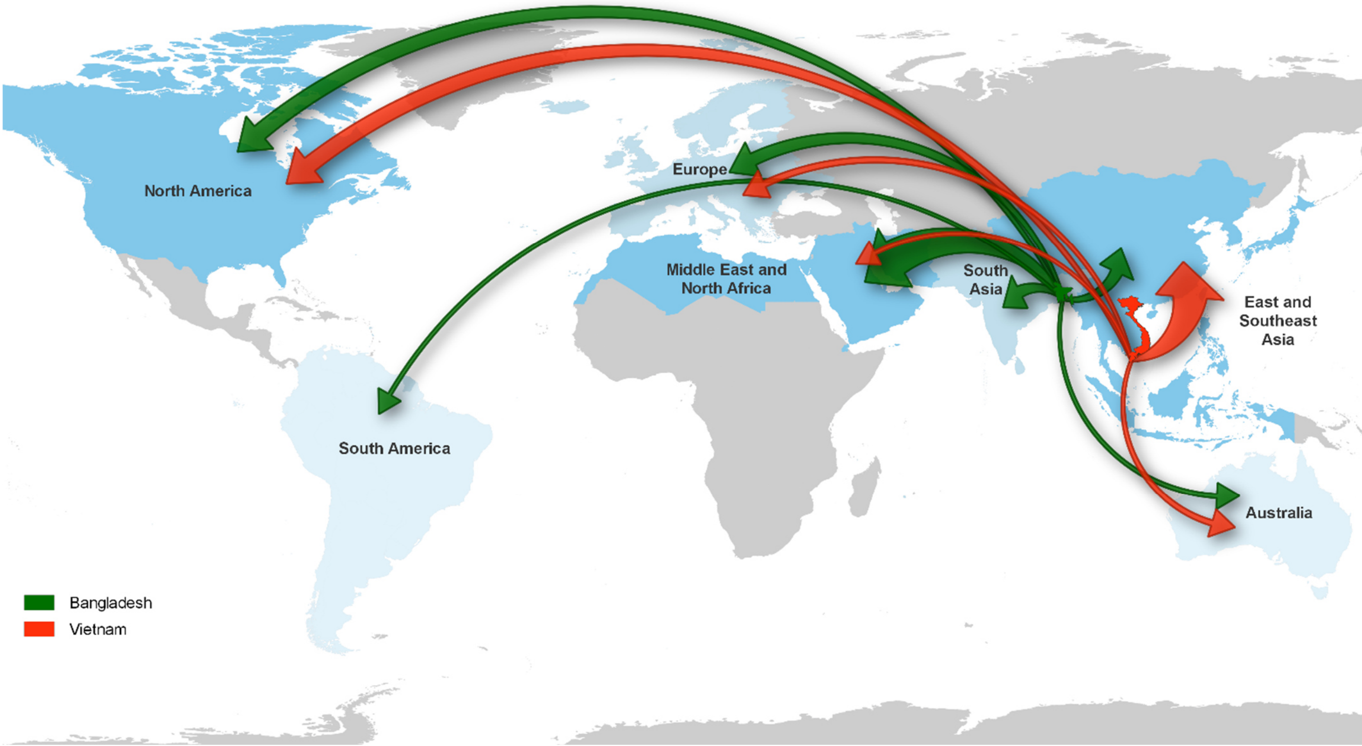
VARIABLES	Median Split: Dist urban > 27.13 km None (1)	Low (2)	Medium (3)	High (4)	Dist urban > 10 km None (5)	Low (6)	Medium (7)	High (8)	Continuous dist urban (0-1) None (9)	Low (10)	Medium (11)	High (12)
1 or 2 extremes	-0.07	0.01	0.12**	-0.06	-0.09	-0.02	0.10*	0.00	-0.05	0.02	0.09*	-0.06
	(0.06)	(0.03)	(0.05)	(0.07)	(0.07)	(0.04)	(0.05)	(0.08)	(0.06)	(0.03)	(0.05)	(0.07)
3 or more extremes	-0.21***	-0.02	0.14***	0.09	-0.28***	-0.03	0.21***	0.11	-0.20***	-0.02	0.15***	0.07
	(0.06)	(0.03)	(0.05)	(0.07)	(0.07)	(0.04)	(0.06)	(0.09)	(0.06)	(0.03)	(0.05)	(0.08)
Distance urban > 27km (=1)	0.01	-0.01	0.05	-0.05								
	(0.06)	(0.03)	(0.05)	(0.07)								
1 or 2 extremes * Distance urban	-0.05	0.03	-0.13*	0.15								
	(0.08)	(0.05)	(0.07)	(0.10)								
3 or more extremes * Distance urban	0.06	0.03	-0.11*	0.02								
	(0.08)	(0.04)	(0.06)	(0.10)								
Distance urban > 10km (=1)					-0.02	-0.04	0.07	-0.02				
					(0.07)	(0.04)	(0.05)	(0.08)				
1 or 2 extremes * Distance urban					-0.02	0.08	-0.07	0.02				
					(0.09)	(0.05)	(0.07)	(0.10)				
3 or more extremes * Distance urban					0.15*	0.04	-0.19***	-0.01				
					(0.09)	(0.04)	(0.07)	(0.10)				
Normalized distance to urban (0-1)									0.12	-0.01	0.10	-0.22
									(0.12)	(0.05)	(0.07)	(0.13)
1 or 2 extremes * Norm distance urban									-0.17	0.04	-0.14	0.26
									(0.17)	(0.06)	(0.10)	(0.18)
3 or more extremes * Norm distance urban									0.06	0.03	-0.21***	0.12
									(0.15)	(0.05)	(0.08)	(0.16)
Constant	0.63***	0.02	0.67***	-0.32*	0.65***	0.03	0.65***	-0.33*	0.62***	0.02	0.66***	-0.29
	(0.16)	(0.06)	(0.12)	(0.18)	(0.16)	(0.06)	(0.12)	(0.18)	(0.16)	(0.06)	(0.12)	(0.18)
Joint F-test interaction	0.00	0.65	0.07	0.15	0.00	0.49	0.01	0.38	0.00	0.43	0.01	0.15
Observations	604	604	604	604	604	604	604	604	604	604	604	604
R-squared	0.29	0.08	0.31	0.11	0.30	0.08	0.32	0.11	0.30	0.08	0.31	0.11
Adjusted R-squared	0.28	0.05	0.30	0.09	0.28	0.06	0.30	0.08	0.28	0.05	0.29	0.09

Controlling for socio-economics, damages and including country fixed effects. Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

S4 International migration aspirations, likelihood and reasons

When respondents were asked where they would move abroad and why we find that they can aspire to a life beyond their national borders: 88% of respondents in Bangladesh and 45% in Vietnam aspired to move abroad (Figure **Fehler! Verweisquelle konnte nicht gefunden werden.**). All but one respondent from Vietnam with an aspiration would like to move to a high-income country such as the USA, Australia, any European country, or also South Korea and Singapore in East Asia, while only 44% (n=94) of respondents from Bangladesh do. The main self-stated reasons for these aspirations are not related to climate and environmental impacts, but rather because of the economic possibilities and general living standard in these countries (see Table **Fehler! Verweisquelle konnte nicht gefunden werden.**). About 10% that aspire to move to a high-income country (n=27) have relatives living there that they want to reunite with. Nearly half of respondents from Bangladesh (n=98) aspire to move to the MENA region for religious and economic reasons and the last 10% (n=25) aspire to move to India because they have relatives there and its proximity to Bangladesh. Respondents that do not aspire to a life beyond their national borders stated that they either had no desire to do so or never actually thought about moving somewhere else.

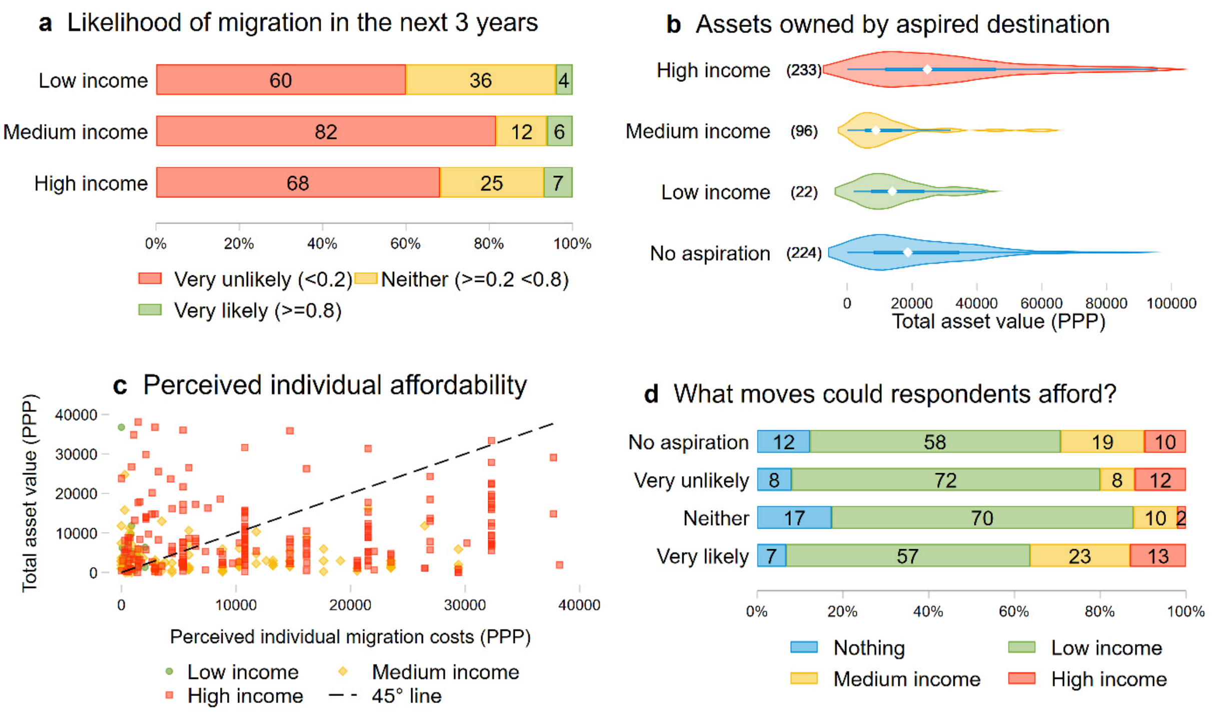
Figure S4. International migration aspirations



Notes: The thickness of each flow between origin and destination is adjusted to the share of all respondents who aspire to move to that region. Regions are colored based on the total share of respondents naming that region. Most respondents aspire to move to high-income countries (East Asia n=128, North America n=84, Europe n=38, and Australia n=11), followed by middle-income in the Middle East and North Africa (n=98) and least preferred are close by South Asian countries (n= 25), mainly India. Created in QGIS based on our collected data.

To get an idea about the perceived feasibility to act on these aspirations, we asked all respondents who aspire to move abroad (n=385) how likely they think it is that they move abroad within the next three years (see Figure S5, panel **a**). Overall, 71% of respondents with an aspiration assessed it as "very unlikely" (n=274), while only 6% are optimistic (n=25) to move abroad. The other 22% (n=86) perceive their chances as neither "very likely" nor "very unlikely". We find no large differences in the likelihood of migration between the different destination regions. Figure S5 (panel **b**) shows the wealth distribution over migration destinations. While it could be the case that people might simply not aspire to move abroad because they lack the funds, we find no evidence that respondents with no aspiration (*median* \$20,619 PPP adjusted) are significantly less wealthy than respondents who aspire to move abroad (*median* \$20,882 PPP adjusted) (Mann-Whitney *U*-Test, z=-0.83, p=0.41).

Figure S5. Migration likelihood and financial feasibility



Notes: Panel **a** shows how likely respondents who aspire to move abroad think it is that they move to their aspired destination in the next three years, considering all financial and legal obstacles. Panel **b** shows respondents' wealth distribution by aspired destination regions clustered into low-, medium-, and high-cost destinations. The self-assessed value of all household assets is used to approximate wealth and includes the following assets: livestock, immovable assets (land, house), and other movable assets (car, boat, agricultural equipment). We lose 11 observations due to missing's in the reported assets. Panel **c** plots self-stated migration costs for the named destination (x-axis) against respondents' asset value divided by household size (y-axis). Named low-cost migration destinations include India and Pakistan, medium cost destinations are MENA countries like Saudi Arabia or Oman, and high-cost destinations include Australia and countries in Europe, North America, and East Asia (Japan, South Korea). Panel **d** shows respondents affordability, based on the aggregate migration costs**,** to move to low-, medium-, and high-cost destinations by likelihood to act on their aspiration.

Being very certain to migrate within the next three years implies having enough wealth to do so. To understand the ability of respondents to act upon their aspirations, we plot respondents' self-assessed costs for their migration aspirations against their wealth (Figure S5, panel **c**). Respondents were asked to consider all possible costs of moving, including having enough money to support themselves in the first month at the destination. For all respondents below the 45-degree line, the perceived migration costs exceed their wealth. Overall, 35% of the respondents with an aspiration perceive to be able to afford to move to the named country. Movements to high income destinations are perceived as more costly (*median* \$10,771 PPP) than to medium- (*median* \$5,882 PPP) and low-income destinations (*median* \$588 PPP). The standard deviations around these mean values reveal substantial difficulties in estimating migration costs for respondents. Given that getting a visa or working permit involves substantial payments to intermediaries and travel costs, estimates for high-cost destinations below $5,000 are unrealistic. Especially in Bangladesh, respondents seem to underestimate these costs, as 56% of respondents who aspire to move to North America estimated the costs to be less than $5,000 PPP. While individual estimates of migration costs might be imprecise, aggregating them reveals a realistic picture of migration costs to different destinations. The average perceived migration costs are, for example, strongly correlated with the migration costs to the same destinations based on official labor migration data from Bangladesh (Pearson-correlation r=0.75, p=0.00). In panel **d**, we show where respondents could afford to go based on the aggregate migration costs. Overall, 11% (n=65) of our respondents could not even afford to move to a low-income destination, 60% (n=370) could afford to move to a low-cost and 19% (n=117) to a medium-income destination. Only 60 out of 613 (10%) respondents could afford a move to a high-cost destination. Yet, only **three** of them assessed their likelihood to move to their aspired high-income destination as “very likely” (South Africa, Australia, Thailand).

Table S19. Reasons and steps for international migration by destination region

	North America	Europe	South Asia	East Asia	Australia	MENA	Total
Estimated costs (PPP)	22266	21272	768	17252	17208	9196	15372
Wealth adjusted for HH size	15434	8209	16546	10492	11289	4618	10240
Affordability (costs/wealth)	0.33	0.26	0.92	0.35	0.55	0.31	0.37
Open question: Any reasons for choosing that country?							
Religious	0.00	0.00	0.08	0.01	0.09	0.51	0.14
Economic	0.39	0.42	0.04	0.27	0.27	0.27	0.30
Social network	0.08	0.13	0.28	0.11	0.09	0.06	0.10
Proximity	0.00	0.00	0.28	0.02	0.00	0.00	0.02
Standard of life	0.40	0.32	0.04	0.31	0.36	0.06	0.25
No reason	0.10	0.06	0.00	0.26	0.20	0.00	0.12
Open question: What concrete steps would you have to take to move to this country legally?							
Passport	0.36	0.45	0.56	0.20	0.27	0.68	0.41
Visa	0.35	0.58	0.40	0.29	0.36	0.53	0.40
Language	0.26	0.11	0.00	0.30	0.27	0.06	0.19
Money	0.10	0.13	0.04	0.11	0.27	0.17	0.13
ID Card	0.20	0.08	0.04	0.28	0.09	0.04	0.16
Ticket	0.00	0.03	0.00	0.00	0.09	0.07	0.02
No step mentioned	0.19	0.22	0.36	0.32	0.10	0.12	0.23
N	84	38	25	128	11	98	384

Notes: The table shows only responses for people that named a country in response to the question: “If you could migrate abroad, where would you go and why?” Respondents that did not name a place abroad when asked where they would migrate abroad most often mentioned “I want to live in Vietnam/Bangladesh” or “never thought about that”. All categories reported for the open questions were created based on a content analysis of the responses (multiple categories could be named by respondents).