Living With Floods Without Being Prepared: Experimental Evidence from Italy

Chiara Binelli*, Chiara Puglisi**

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***Abstract*:** In recent years, Europe has experienced an increasing number of devastating floods. In 2023 alone, 26 flood events were reported in the first nine months of the year. Two of such events were the floods that hit the Italian regions of Emilia Romagna in May 2023 and Tuscany in November 2023. Using an original survey instrument on a representative sample of the Italian population of residents in Emilia Romagna and Tuscany, we investigate individuals' climate adaptation and mitigation responses, including their preparedness against extreme climatic events and the determinants of such preparedness, their perception of flood risk likelihood across key life domains, their support for green policies, and their intention to adopt mitigation measures. We further examine whether targeted risk communication can enhance these climate adaptation and mitigation responses through two pre-registered randomized experiments testing the causal impact of flood risk information on the same set of outcomes. Our findings reveal that respondents were highly unprepared, with around 70% per cent of the sample having never taken any action to equip their home to handle extreme climatic events. The experimental results demonstrate that the provision of information on floods' risk through an effective video message significantly improves individuals' pro-environmental behavior, their perception of the danger of floods, and their intention to vote for a political coalition that will prioritize on combating climate change. Providing information on flood risk can thus contribute to promoting the vast support for the necessary actions to address the climate crisis.

Key Words: Extreme Climatic Events; Preparedness; Adaptation; Support for Climate Policy; Online Randomized Experiment.
JEL Codes: Q54; D84; C93.

* Department of Political and Social Sciences, University of Bologna and Center for Research and Social Progress. Corresponding author: chiara.binelli@unibo.it
** Department of Statistical Sciences, University of Bologna

3. Introduction

In the past few years, Europe has experienced an increasing number of catastrophic floods. In 2023 alone, 26 flood events were reported in the first nine months of the year with widespread impacts across the continent. According to Copernicus data, during 2023, one third of the European river network saw river flows exceeding the high flood threshold, and 16 percent exceeding the severe flood threshold[1].

In May 2023, the Emilia-Romagna and Marche regions of Italy experienced severe flooding due to Storm Minerva. In early November of the same year, a powerful storm unleashed damaging winds and torrential rain across much of Western Europe. The Tuscany region of Italy was one of the hardest affected areas, where the storm caused widespread flooding visible in satellite images[2]. Less than a year after, in October 2024, another flood hit the north of Italy with the city of Bologna in the Emilia-Romagna region receiving 180 mm of rainfall – its average for September and October – within just 24 hours, with an intensity typical of summer thunderstorms. Rapid climate attribution assessments of the October 2024's flood found that the unprecedented increase in precipitation and wind strength were likely driven by anthropogenic climate change rather than by natural variability alone (Coppola *et al.* 2024), as it was the case for the persistent and intense rainfall in September 2024 due to storm Boris (Faranda *et al.* 2024 and Kimutai *et al.* 2024). Then, on October 30, 2024, another deadly flood event hit Valencia in Spain killing at least 200 people and leaving over 2,000 people missing.

In response to these disasters, the European Union has mobilized substantial financial support. In August 2024, the EU prepared €446.6 million in aid for affected regions, with €378.8 million allocated to Emilia-Romagna and €67.8 million to Tuscany, to assist in recovery and reconstruction efforts.

With devastating floods projected to become more frequent and intense, an increasing concentration of people living close to rivers (Ceola, Laio and Montanari 2014), and a general increase in flood hazard expected in Italy over the course of the 21st century (Garcia-Valdecasas Ojeda *et al*. 2024), monitoring and improving the preparedness of flood-prone regions and their populations is crucial. Additionally, investigating people's satisfaction with existing emergency-related information and the specific type of information they would want to have to better face future hazards is crucial to design targeted information campaigns and emergency protocols that align with citizens' actual needs, ultimately improving disaster response outcomes. Similarly, understanding the effectiveness of targeted risk communication interventions in promoting both individual preparedness and broader climate action is essential for developing comprehensive adaptation and mitigation strategies.

In this paper we assess individuals' preparedness against floods and the determinants of such preparedness, and examine through two pre-registered randomized experiments whether targeted flood risk information can enhance risk awareness, pro-environmental behavior, and support for climate policies. To do this, we designed an original survey instrument that we fielded to a representative population of residents in the Italian regions of Emilia Romagna and Tuscany in July 2024 after the floods that hit these regions in May and November 2023. In December 2024, after the devastating floods that hit Italy again, we fielded a follow-up survey, creating a panel dataset for respondents who participated in both surveys, which allows us to examine changes in preparedness over time. In addition,

[1] https://climate.copernicus.eu/esotc/2023/flooding
[2] https://earthobservatory.nasa.gov/images/152051/flooding-in-tuscany

each survey includes a pre-registered experiment[3] where we randomly primed information on the severity and intensity of flood risk to assess the impact of this priming on several outcomes, including flood risk awareness, perceptions of climate change, support for policies to fight climate change, pro-environmental behaviour, and voting choices. In the first survey, respondents in the treatment group were asked to report their municipality of residence, after which they were provided with information about the flood risk specific to their municipality. In the second survey, the treated group watched a one minute and fifteen seconds video explaining the causes, consequences, and dangers of floods.

We find that residents of both Emilia-Romanga and Tuscany were highly unprepared against extreme climatic events, with 70 per cent of the sample having never taken any action to equip their home to handle extreme climatic events. The results also reveal a critical gap in floods risk communication, with most respondents reporting that existing information was inadequate and that they would have acted differently had they known their home was at risk of flooding. Key information individuals reported as needed include a list of actions to manage floods and flood risk levels in the area.

On the determinants of preparedness, we find the number of over 75 years old individuals in the household and the number of years lived in the house to be positively associated with preparedness before the floods, as well as employed and married respondents to be more likely to have adopted any measure of preparadness against extreme climatic events before the 2023 floods than their unemployed, inactive, and separated/divorced counterparts. Looking at preparedness after the flood events of 2023 and 2024, we find parenthood to be a significant predictor of preparedness, with individuals with one child being more likely to have adopted preparedness measures than childless individuals. Importantly, having suffered damages from the floods is also an important determinant of preparedness, with individuals having experienced a flooding of either the external or internal area of the house and individuals having lost work days because of the floods being more likely to have chosen to equip the house against extreme climatic events.

Consistently with a low level of preparedness and a demand to improve floods risk's communication, we find that providing information on flood risk through a visually effective video message positively affects individuals' awareness of the danger of floods and their impacts on health and work, pro-environmental individual actions, and the intention to vote for a political coalition that will prioritize on combating climate change. Confirming the findings of Binelli, Loveless and Shaffner (2023), we thus find that providing information on floods' risk can act as a catalyst to promote climate action, which can in turn contribute to reducing the incidence of extreme climatic events and the impact of climate change in the long run.

2. Related literature

This paper is related to two main strands of literature. The first strand is the extensive work on preparedness against extreme climatic events of which floods are one widespread example, while the second strand is the body of work that studies how exposure to extreme climatic events impacts individuals' willingness to take pro-environmental invidual actions and support policy interventions to combat climate change.

[3] Both experiments were pre-registered at the American Economic Association RCT Registry with the following pre-registration numbers: AEARCTR-0013946 and AEARCTR-0014991.

2.1 Preparedness against extreme climatic events

As extreme climatic events become more frequent and intense, assessing preparedness against these events is essential to reduce vulnerabilities and increase resilience to face escalating environmental challenges. Various studies have explored the individual-level determinants of individuals' and households' preparedness. Among these, Munthali, Outwater, and Mkwinda (2024), focusing on Malawi, found education to be the sole significant determinant of emergency preparedness, while other socio-demographic factors such as gender, age, marital status, occupation, number of children, and house ownership were not significant. This aligns with the study by Hoffman, Muttarak and Pothisiri (2011) who, looking at the Philippines and Thailand, found education to be a key factor promoting individuals' disaster preparedness. Consistently with these findings, Ashenefe et al. (2017), studying determinants of flood preparedness in Ethiopia, highlighted for education to play a pivotal role for household flood preparedness. Similarly, in the U.S., Zamboni and Martin (2020) reported higher overall levels of preparedness among households headed by individuals with relatively high educational levels. Conversely, Xu et al. (2015), in a study on a Chinese province, did not find a significant role for education in predicting emergency preparedness.

Mixed results also characterize the role of gender as a driver of preparedness. Xu et al. (2015) reported that women in a Chinese province were more prepared against emergencies (measured by possessing essential items), while Cvetkovic et al. (2018) found men to be more knowledgeable and confident in their capabilities to prepare for flooding in Serbia. Al-rousan et al. (2014), looking at the U.S., found that gender was not associated with preparedness levels. These divergent results highlight the need for further research to understand the role of gender for preparedness against extreme climatic events in different cultural and geographical contexts.

Age shows a more consistent pattern, though not without its complexities. Al-rousan et al. (2014) found that older age was a significant predictor of lower preparedness scores, a finding in contrast with Ashenefe et al. (2017), who linked older age to higher flood preparedness. Zamboni and Martin (2020) offered a more nuanced perspective, distinguishing between resource-based and action-based preparedness. Their analysis revealed that households with adults aged 65 or more were more likely to meet resource-based preparedness items but less likely to engage in action-based preparedness. This suggests that while older individuals may accumulate more resources, they might face barriers to active preparedness.

Income and wealth consistently appear as significant predictors of preparedness. A positive association between income and preparedness was indeed highlighted in various studies (Al-rousan et al. 2014; Najafi et al. 2015; Xu et al. 2015; Ashenefe et al. 2017; Shapira et al. 2018). Zamboni and Martin (2020) further support this, showing that, in the U.S., wealthier households were more likely to meet resource-based preparedness items. These findings collectively suggest that economic resources play a crucial role in enabling households to acquire necessary items for preparedness.

Other socio-demographic factors like marital status, occupation, number of children, and house ownership have been explored, but their significance is less consistently established across studies. Munthali, Outwater, and Mkwinda (2024) found no significant association for these factors in Malawi. Conversely, Zamboni and Martin (2020) observed that households with children were generally less prepared, though more likely to have an alternative meeting location, indicating a specific adaptation.

Beyond basic socio-demographic characteristics, several other factors have been identified as crucial for preparedness. Previous experience with emergencies is repeatedly cited as a strong determinant. Xu et al. (2015) found that prior emergency experience was

a significant predictor of preparedness. Ashenefe et al. (2017) also linked prior exposure to a flood to household flood preparedness, and Shapira et al. (2018) noted a positive association between experience with previous emergencies and preparedness. Consistently with this, Najafi et al. (2015) found for previous disaster experience to be linked with disaster preparedness behaviors.

Knowledge about emergency and risk awareness are also critical. Xu et al. (2015) identified both knowledge about emergency and risk awareness as significant predictors of emergency preparedness. Ashenefe et al. (2017) similarly found that knowledge of flood prevention was significantly associated with household flood preparedness. These findings underscore the importance of public education and awareness campaigns in fostering preparedness.

Attitudes towards preparedness and self-efficacy play an important psychological role. Xu et al. (2015) highlighted that positive attitudes towards emergency preparedness and self-efficacy were significant predictors. Self-efficacy, defined as an individual's belief in their ability to successfully execute a task, can be a powerful motivator for taking preparatory actions. Furthermore, factors such as reception of household-level warning messages and length of a flood have been linked to preparedness (Ashenefe et al. 2017), suggesting that timely and relevant information, as well as the nature of the hazard itself, can influence preparatory behaviors. Besides works investigating single groups of determinants, studies such as Titko et al. (2021), focusing on Slovakia, adopt a more comprehensive approach, examining a broader range of factors including age, gender, education, social status, location of living, type of living place, number of people in the household, number of disabled people in the household, and economic situation. This comprehensive approach acknowledges the multifaceted nature of preparedness and the interplay between various determinants.

2.1 Exposure to extreme climatic events, pro-environmental actions and support for green policies

In addition to assessing preparedness, we study whether targeted flood risk information can enhance risk awareness, pro-environmental behavior, and support for climate policies. A second strand of relevant literature is thus the work that has studied how exposure to climate chage affects willingness to take pro-environmental individual actions and support policy interventions to combat climate change.

Soni and Mistur (2022) use natural disaster data from 1980 to 2018 and find that the number of disasters significantly affect public support for environmental spending and that different types of disaster have heterogeneous impacts, with wildfires and severe winter climatic events being the most impactful. Guiso and Jappelli (2024) find that providing information about the consequences of hydrogeological risk causes individuals to increase both support for public funding and individual willingness to pay for the policy.

For pro-environmental individual actions, Ladini and Moroni (2025) provide experimental evidence on how recalling an extreme climatic event influences individuals' support for climate mitigation policies. Here, too, heterogeneities emerge, as different types of extreme climatic events exert distinct effects on people's willingness to support policies for climate change mitigation. Specifically, while individuals exposed to reminders of glacier collapses were found to be significantly more willing to accept limitations in their standard of living for climate action, those exposed to reminders of the floods that hit Emilia Romagna in 2023 did not exhibit a comparable shift in attitudes or policy support. The authors attribute this divergence to differences in the perceived attribution of these events to climate change: glaciers collapses are widely recognized as direct consequences of

global warming, whereas floods have a more ambiguous attribution, as local factors such as land management and infrastructure play a key role in shaping their impact. Media framing further reinforced this distinction, with the glacier collapse presented as a clear and iconic manifestation of climate change, while for the Emilia-Romagna floods there were competing narratives attributing them either to climate change or to governance failures.

Regarding determinants of pro-environmental behavior, Kollmuss and Agyeman (2002) examine the previous literature and identify three main categories of factors, namely demographic, external (e.g.: institutional, economic, social, and cultural) and internal factors (e.g.: motivation, pro-environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, and priorities). Li *et al.* (2019) also find that demographic variables and internal factors such as identity and psychological factors are key determinants of pro-environmental actions when these actions are measured by resources' conservation and recycling over the past several decades.

Pro-environmental behavior tends to be costly for the present but beneficial in the future. Therefore, when individuals consider the future beyond the present, they can accept constraints and make efforts to achieve future benefits. Consistently, Strathman *et al.* (1994) argue that a future time perspective is a key determinant of a more sustainable behavior, and Collet *et al.* (2023) find that considerations for future consequences positively affect the preferences for a reduction of CO2 emissions. Binelli, Loveless and Shaffner (2023) find that providing prospective information on future climate change impacts pro-environmental individual actions and support for policy across party lines.

On support for green policies to combat climate change, Drews and van den Bergh (2016) provide a comprehensive summary of the various determinants in empirical and experimental research and draw attention to the importance of perceptions about climate change, climate policy design and its attributes. In a recent study on Italy, Colantone *et al.* (2024) find that the implementation of green policies and public support depend on the redistributive consequences that the policies have on different groups. Fang and Innocenti (2023) study how social norms and economic reasoning jointly shape public views towards carbon taxation and find that video interventions that correct misperceived norms about climate action and/or explain the policy lead to an initial boost in support that fades away after several months and does not increase environmental donations.

In a recent review of the literature on the economic impacts of disasters caused by extreme climatic events, Ferreira (2024) discusses how governments can play an important role in adaptation by providing public goods to manage disaster risks or by facilitating private agents' adaptation responses. Using new surveys conducted in twenty countries, Dechezleprêtre *et al.* (2022) find that support for climate policies is driven by the perception of the effectiveness of the policies in reducing emissions, in addition to their distributional impacts and their impact on respondents' own households.

3. Data and experimental design

3.1 The survey

We designed an original survey instrument that we administered to a representative sample of adult residents in the Italian regions of Tuscany and Emilia Romagna. We conducted a first data collection in July 2024 and a follow-up survey in December 2024. The first data collection took place between July 4th and July 18th, 2024. A total of 3,470 individuals completed the survey. Of these, 1,973 were residents of Emilia Romagna and 1,677 of Tuscany. From the initial pool of 3,470 respondents, 2,400 gave consent to participate, completed the baseline survey, and passed an attention check. We excluded individuals who reported implausible values (e.g., respondents who reported having more than 10 children and respondents co-residing with more than 6 individuals aged 75 or older), and/or provided non-substantive responses to demographic questions (e.g., stating "the more the merrier" when asked about ideal number of children). Respondents who did not identify as either male or female were also excluded[4]. Using these criteria yielded a final sample of 2,383 participants in the first survey. The second data collection took place between December 19th and December 23rd, 2024. A total of 889 individuals (25 per cent of the original sample) completed the follow-up survey.

The survey was programmed in Qualtrics and used individuals recruited from the survey firm Demetra. Demetra provided a pool of respondents that is balanced across gender, age, and province of residence to reflect the demographic profile of the adult population of residents in the Italian regions of Emilia Romagna and Tuscany. In addition to socio-demographic variables (only included in the baseline survey), the survey includes a Section on awareness and management of flood risk, a Section on the impact of floods on individuals' assets, health and work, and a Section on future expectations and climate change perceptions. The final section on future expectations and climate change perceptions was administered immediately after each survey's randomized experiment.

We measure preparedness against floods using a survey question that asks detailed information on which actions respondents have taken to increase preparedness. The preparedness question in the first survey reads as follows: "Prior to the 2023 floods in Emilia Romagna/Tuscany, was your home equipped to deal with extreme climatic events?", and in the second survey it reads as follows: "Between September and October 2024, Emilia Romagna/Tuscany was repeatedly hit by intense floods. As a result of these floods, did you equip your home to deal with extreme climatic events?". In each survey, respondents who answered positively to the question, could then select one or several of the following eleven options:

1. With emergency food supplies.
2. With emergency potable water supplies.
3. With a first aid kit .
4. With a medications kit.
5. With an emergency power generator.
6. With an emergency plan that includes instructions for residents on where to go and what to do in case of danger.
7. With structural repairs or improvements to your home.

[4] This decision–while regrettable–was dictated by the structure of our pre-registered analytic design, which relies on binary gender comparisons and lacked sufficient statistical power to analyze non-binary respondents as a distinct group.

8. By increasing the elevation of the home.
9. With flood preparedness equipment (e.g. water pumps and/or sandbags).
10. With insurance against extreme climatic events.
11. With other (please specify).

It is important to note that even if the answer options are the same, the two preparedness questions refer to two different time periods: in the first survey, we elicit a measure of *ex-ante* preparedness, that is preaparedness before the flooding events, while in the second survey we elicit a measure of *ex-post* preparedness, that is preparedness after the flooding events of both 2023 and 2024. The *ex-ante* preparedness captures the baseline level of preparedness in our sample, while the *ex-post* preparedness assesses if there has been any change in preparedness following the flooding events in 2023 and 2024. Both measures are important to inform effective strategies to increase preparedness against floods. As a first, simple measure of preparedness, we constructed a dummy variable that is equal to one if a respondent has taken at least one of the listed actions, and zero otherwise. As an second measure of preparedness, we use a two-parameter logistic item response theory (2PL IRT) model to estimate a latent trait from individuals' answers among the eleven response items respondents could select in the preparedness questions, and we standardized the latent scores to a [0,1] scale using min-max normalization. Higher values of the constructed scale indicate greater preparedness.

3.2 The experimental design

The survey included two pre-registered randomized experiments, one in the baseline survey conducted in July 2024 and one in the follow-up survey in December 2024. For the first survey, 1,137 individuals were in the treatment group, and 1,246 in the control group. In the follow-up survey, 440 subjects were in the treatment group, and 449 were in the control group.

In the first survey, respondents randomized to the treatment group were presented with an informational text about flooding and Italy's hydraulic hazard assessment framework, followed by an interactive map showing municipality-level flood risk data. Specifically, the treatment group was presented with the following text:

> *"Flooding is the temporary inundation of an area that is typically dry, caused by heavy or prolonged rainfall. This can significantly affect the flow of rivers, streams, canals, and sewage networks, leading to considerable damage. On a national level, there is a framework for identifying areas at hydraulic hazard and hydraulic risk. To measure the hydraulic hazard of a flood, the frequency and intensity with which it might occur are evaluated. At this link, you will find a map showing the percentage of the population in each Italian municipality exposed to medium hazard (infrequent floods) and high hazard (frequent floods). We kindly ask you to carefully examine the map, identify the municipality where you usually reside, and take note of the percentage of people living in high hydraulic hazard areas.".*

The map the text refers to can be accessed at the following link: https://www.datawrapper.de/_/pk4pM/.

In the follow-up survey, respondents randomized in the treatment group watched a one minute and fifteen seconds' video explaining the causes, consequences, and dangers of floods. The video was created by editing an original video produced by the American

television channel *The Weather Channel*[5], and it can be accessed at the following link: https://q.opinioni.net/upload/surveys/393663/files/videonew.mp4

In both surveys, subjects assigned to the control group did not have to complete any task and were not given any information. They simply moved directly to the section of the survey that includes the questions on the dependent variables of our analysis.

We consider three main groups of dependent variables.

The first group of dependent variables captures support for green policies, which we elicit using two main survey questions: one question that assesses respondents' support for or opposition to five climate-related policies, and one question that elicits the subjective probability, on a scale from 0 to 100, to vote for a political coalition that puts combating climate change at the centre of its political agenda in the next national election. For the first question on support for or opposition to climate policies, we consider the following policies:

1) Require that 50% of all vehicles sold in Italy by 2030 be electric.
2) Require every city to use electricity produced from renewable sources (wind, solar, and hydroelectric), even if electricity prices increase.
3) Increase taxes on fossil fuels.
4) Increase government subsidies for renewable energy, such as solar and wind power.
5) Ban the sale of household appliances that do not meet energy efficiency standards.

The pro-climate position would be to support each of the five listed items. These items were combined into a single scale using an Item Response Theory (IRT) two-parameter logistic model. This approach created a single latent variable with a mean of 0 and standard deviation of 1, which we then re-scaled to range from 0 to 1, with higher values representing more support for policies that address climate change.

The second group of dependent variables captures the extent to which respondents indicate to be willing to take personal actions to address climate change. We use one survey question asking respondents about six actions and indicating that they had already taken the action, that they were planning to take the action, or that they were not planning to take that action. The individual actions are as follows:

1) Install solar panels at your home.
2) Purchase a hybrid or electric car.
3) Take steps to increase your home's energy efficiency.
4) Reduce your weekly amount of meat consumption.
5) Take fewer trips by plane.

Responses were re-coded so that each item was coded as a 1 if the respondent had taken or was planning to take that action and 0 if they were not planning on taking the action. We then combined the items in a similar way as described above for support for green policies, using an IRT two-parameter logistic model and then re-scaling the variable so that values on the scale closer to 1 indicated respondents who were taking more climate friendly actions and those near 0 indicated individuals who were not taking climate friendly actions.

The third group of dependent variables measures awareness of flood risk using a series of subjective probability questions on the likelihood of being affected by floods in the area of work, health and decision to move, and the probability that in the municipality of residence and at the national level, in the next five years, policies and interventions to tackle extreme climatic events will be implemented.

[5] https://youtu.be/PvJuocemHS4

Finally, only in the follow-up survey, we also ask a battery of questions that capture the extent to which respondents are willing to accept changes in the standard of living to promote climate change mitigation, and to pay a monetary cost (and, if so, how much) to reduce the impact of climate change. Specifically, individuals are asked:

1) Suppose a proposal is put forward next year to add a monthly charge to the electricity bill to reduce the impact of climate change. Would you vote for or against it?

In case the respondent selected they would vote for it, they were asked:

   1.1) You answered that you would vote in favour of any proposal to add a monthly charge to your electricity bill to reduce the impact of climate change. How much would he be willing to pay?

2) How much would you agree with the idea of paying higher taxes to reduce the impact of climate change? (Possible responses: strongly agree; somewhat agree; neither agree nor disagree; somewhat disagree; completely disagree)

3) To what extent would you be willing to accept limitations to your standard of living to help mitigate climate change? (Possible responses: very willing; fairly willing; neither willing nor unwilling; unwilling; not at all willing; don't know).

4) How much do you agree or disagree with the following statements? More money should be spent on mitigating climate change...
   4.1) More money should be spent to mitigate climate change even if it required cuts in social benefits.
   4.2) More money should be spent to mitigate climate change even if it required tax increases for people with high incomes.
   4.3) More money should be spent to mitigate climate change even if it required tax increases for people of all income brackets.

Possible responses to 4.1, 4.2, and 4.3 included strongly agree; somewhat agree; neither agree nor disagree; somewhat disagree; completely disagree.

4. Results

4.1 Descriptive statistics

Table 1 provides descriptive statistics on the sociodemographic characteristics of the analysed sample, both for the main and the follow-up survey.

The sample is gender-balanced, with the gender composition appearing largely consistent between the baseline and the follow-up survey, suggesting good retention across gender categories. As for marital status, half of survey subjects in the baseline survey are married (51%), followed by single/unmarried (40%). Smaller groups are separated/divorced (8%) and widowed (2%). There is a slight increase in the proportion of married individuals in the follow-up group (56% vs. 51%), and a corresponding decrease in single/unmarried individuals (40% vs. 33%). The proportions for separated/divorced and widowed remain stable.

Regarding education, the majority of respondents has a high school degree, followed by individuals with a university degree. Very small percentages are observed in the other categories. These figures are consistent across both surveys.

Concerning employment status, the vast majority of the sample (68%) participates to the workforce, followed by retired individuals (11%). The follow-up sample shows a slight shift towards a higher proportion of retired individuals, at the expenses of unemployed individuals and students, while the proportion of employed subjects remains stable.

Income is distributed across various bands, with the largest proportions in the middle-income ranges (2,001 to 3,000 euros: (25%); 3,001 to 5,000 euro: (21%)). The income distribution appears generally consistent across both surveys, with no drastic shift between the first and the second sample.

Table 1: Descriptive Statistics of Baseline Survey and Follow-up Survey

	Main Survey ***N (%)***	***Follow-up*** ***N (%)***
Gender		
Male	1,042 (44%)	426 (48%)
Female	1,341 (56%)	463 (52%)
Marital status		
Single/Unmarried	944 (40%)	295 (33%)
Married	1,204 (51%)	496 (56%)
Separated/divorced	196 (8%)	80 (9%)
Widow	39 (2%)	18 (2%)
Education		
Middle school or lower	217 (9%)	78 (9%)
High school	1,268 (53%)	473 (53%)
Bachelor degree or higher	898 (38%)	338 (38%)
Employment status		
Worker	1,609 (68%)	595 (67%)
Unemployed	212 (9%)	56 (6%)
Student	193 (8%)	51 (6%)
Retired	268 (11%)	149 (17%)
Inactive	101 (4%)	38 (4%)
Net monthly income		
Less than 1,001 euros	109 (5%)	35 (4%)
1,001 to 1,500 euros	252 (11%)	73 (8%)
1,501 to 2,000 euros	385 (16%)	151 (17%)
2,001 to 3,000 euros	597 (25%)	244 (27%)
3,001 to 5,000 euros	495 (21%)	197 (22%)
5,001 to 10,000 euros	166 (7%)	55 (6%)
More than 10.000 euro	158 (7%)	44 (5%)
Don't know	221 (9%)	90 (10%)

Source: authors' calculations on original survey data.

Descriptive statistics on individuals' preparedness against extreme climatic events are presented in Figure A1, in the form of pie charts reporting the percentage of individuals that have adopted at least one preparedness measure and the percentage of individuals that have adopted no measure against extreme climatic events. We find that, before the 2023 floods in Emilia Romagna and Tuscany, nearly 70% of respondents had never taken any action to prepare their homes for extreme climatic events. In the follow-up survey,

approximately 80% still reported having adopted no preparedness measures, with only 21% having adopted any such actions.

Beyond examining preparedness levels, we investigate flood risk communication by analyzing whether individuals would have made different residential location choices had they known their flood risk in advance. We examine this question separately for those who experienced flood damage[6] and those who did not (Figure A2).

Among individuals interviewed in the baseline survey who experienced no damage from the 2023 flood, only 24% initially report they would have chosen a different location. However, in the follow-up survey, this proportion increases to 37% among those who remained undamaged by both floods. This increase suggests that even individuals who escaped any flood-related damage to their house experienced a shift in risk perception that influenced their retrospective housing preferences.

The pattern becomes more pronounced among those who suffered flood-related damages. Among respondents damaged by either the 2023 or 2024 floods, almost 50% report they would have chosen a different location had they known their flood risk. Most strikingly, among individuals who suffered damages from both floods, this proportion rises to 65%.

These findings reveal a clear monotonic relationship between flood damage exposure and regret over location choice. The progression from 24% (no damage, initial survey) to 37% (no damage, follow-up) to 50% (damage from one flood) to 65% (damage from both floods) demonstrates that both direct damage experience and prolonged exposure to flood events in the community systematically increase individuals' retrospective desire to have chosen safer locations, had adequate risk information been available.

Figure A3 shows the distribution of responses[7] to the question on the types of information that respondents would like to receive to increase their knowledge of flood risk, respectively in the baseline survey and in the follow-up survey. In the baseline survey, only around 10% of respondents report being satisfied with currently available information. The most sought-after individual information types are lists of actions to manage floods (approximately 64% of respondents) and flood risk levels in the area (46%). Approximately 15% report wanting all three types of information: flood risk levels, management actions, and historical flooding information. On the other hand, only about 28% are interested in historical flooding information (whether alone or in combination with other types). This suggests that respondents prioritize actionable, forward-looking information over historical context when seeking to increase their flood risk knowledge.

Regarding the distribution of responses to the same question in the follow-up survey, we detect notable changes in information preferences over time. The proportion of respondents satisfied with currently available information dramatically increases to approximately 70% (compared to only 10% in the baseline survey), suggesting a substantial shift in perceived information adequacy between the two survey periods. Among those still seeking additional information, list of actions remains the most sought-after type of information, followed by knowledge of the flood risk level of the area. Information on whether the area where the person lives had been flodded remains the least requested type of information, consistent with the baseline survey findings. This reinforces the idea that historical flooding data is perceived as less valuable than actionable and risk assessment information. The overall distribution suggests that respondents' information needs were largely met during the period between surveys, with only a small minority continuing to seek additional flood risk knowledge across the various categories.

[6] Defined as having experienced a flooding of more than 10% of the internal or external area of the house.
[7] Both stacked bar charts display both individual information types and their combinations, which explains why the percentages sum to more than 100%.

We now turn to the distribution of responses in the three groups of dependent variables on which we later evaluate the impact of our two experiments (Figure A4).

The first group of dependent variables includes support for policy interventions aiming at mitigating climate change. Support varies significantly by measure. In the baseline survey we find broad support for requiring cities to use renewable electricity, with approximately 72% of respondents favoring this policy even if it would increase electricity prices. In addition, broad support is also found for increasing government subsidies for renewable energy (~85%), and banning the sale of home appliances that do not meet energy efficiency standards (~80%). However, only about 45% of respondents endorse requiring for half of vehicles sold in Italy by 2030 be electric, and about 40% report that they would support an increase in taxes on fossil fuels. In the follow-up survey, opposition slightly increases for both the electric vehicle target and the requirement for cities to use renewable electricity, while support for the other policies remaines stable.

The second group of dependent variables includes pro-environmental actions that individuals have taken - or intend to take - to mitigate climate change. Descriptive results are reported in Figure A5. In the baseline survey most respondents report having already adopted or intending to adopt key measures such as improving home energy efficiency (~90%), reducing meat consumption (~80%), and reducing air travel (85%). A smaller proportion report having installed or intending to install solar panels (~65%) or purchase hybrid or electric cars (~60%). These figures remain fairly stable in the follow-up survey.

The third and final group of dependent variables includes individuals' perceived probability of being impacted by floods in the three key areas of work, health, and the decision to move house. In both surveys (Figure A6), we observe a left-skewed distribution across all three categories: a larger proportion of respondents perceives a relatively low probability of being impacted by flood events, with fewer respondents perceiving higher probabilities. However, in comparison with the baseline survey, we observe a slight decrease in the peak frequency at the lowest probability, particularly in the areas of work and health, suggesting a slight increase of perceived risk or a decrease in the certainty of very low risk of being impacted by floods in these two life areas.

As for respondents' willingness to pay monetary costs to mitigate climate change, only about 35% support a policy involving an increase in the monthly electricity bill. Among these, 40% are willing to pay €1, 45% €10, and just 15% are willing to pay at least €20 (Figure A7). Support for increasing general taxation to fund climate change mitigation is also found to be low, with only approximately 20% of respondents being in favor. As shown in Figure A10, more than 80% reject the idea that taxes should be raised across all income groups for climate change mitigation, indicating broad resistance to universally applied fiscal measures. By contrast, support for progressive taxation is found to be substantially higher, with over 60% endorsing an increase in taxes on high-income individuals to fund climate change mitigation. Only about 25% report supporting a reallocation of funds from social benefits toward climate mitigation, yet 55% express willingness to accept a general reduction in living standards for climate change mitigation purposes. These results suggest that while abstract support for climate action exists, there is limited public willingness to bear financial costs, particularly when costs are perceived as socially regressive.

4.2 Regression results

4.2.1 - Determinants of preparedness against extreme climatic events

The existing literature provides a complex picture of flood preparedness' determinants. While some factors like income and previous experience show a relatively consistent

positive associations with preparedness, others like education and gender present conflicting findings across different geographical and cultural contexts. In our survey, we elicit both *ex-ante* and *ex-post* preparedness and include an array of potential determinats to study the interplay between various socio-demographic and contextual factors.

To assess determinants of *ex-ante* preparedness, that is, individuals' level of preparedness against floods prior to the flood events of 2023, we estimate a regression model controlling for two main groups of determinants: sociodemographic variables (gender, marital status, level of education, employment status, number of children, number of elderly people living in the household), and house-related factors (type of property, whether for rent or owned, and the number of years the respondent had lived in the same house). To investigate the drivers of *ex-post* preparedness, that is, preparndess against floods after the flood events of 2023 and 2024, we estimate the same regression model that we used for *ex-ante* preparedness augmented with three measures of the impact of the 2024 floods: whether the person suffered damages to their property, the number of work days lost due to the floods, and whether the respondent had to relocate because of the floods. Additionally, when looking at *ex-post* preparedness, we further include a binary indicator for whether the individual had adopted any *ex-ante* preparedness measure. Both models include a dummy for whether the individual lives in a flooded municipality, and municipality-level fixed-effects (f.e.). Table 2 reports the results.

Table 2: Linear Regression on Preparedness against extreme climatic events in the Baseline and Follow-up Survey

	Preparedness Baseline	Preparedness Follow-up
Gender (Ref. Male)		
Female	-0.01 (0.01)	0.01 (0.01)
Education (Ref. Middle School or lower)		
High school	-0.01 (0.01)	-0.04 (0.02)
Bachelor's or higher	0.01 (0.02)	-0.04* (0.03)
Employment status (Ref. Worker)		
Unemployed	-0.03* (0.01)	-0.03 (0.03)
Student	0.02 (0.02)	-0.02 (0.03)
Retired	-0.00 (0.01)	-0.01 (0.02)
Inactive (Not working nor looking for work)	-0.05*** (0.02)	0.03 (0.03)
Marital status (Ref. Married)		
Single/Unmarried	-0.01 (0.01)	0.01 (0.02)
De facto or legally separated/Divorced	-0.04** (0.02)	-0.02 (0.02)
Widow	0.00 (0.03)	-0.09** (0.04)
N. of children (Ref. None)		
1	0.00 (0.01)	0.03* (0.02)
2	0.00 (0.01)	0.02 (0.02)
3 or more	-0.00 (0.02)	0.01 (0.03)
N. of elderly people (75+) in the household	0.02* (0.01)	-0.01 (0.02)
Type of property (Ref. For rent)		
Owned by you (or by the person with whom you live with)	0.01 (0.01)	0.01 (0.02)
N. of years lived in house (Ref. <1)		
Between 1 and 4 years	0.13* (0.07)	-0.04 (0.17)
Between 5 and 9 years	0.14* (0.07)	-0.02 (0.17)
10 years or more	0.12* (0.07)	-0.02 (0.17)
Satisfied with information on flood risk (Ref. No)		
Yes	0.04** (0.01)	0.03** (0.01)
Got damaged by the floods (Ref. No)		
Yes, one		0.05*** (0.02)
Yes, both		0.09** (0.04)
Had to relocate because of any flood (Ref. No)		0.01 (0.02)
Number of lost work days because of any flood (Ref. None)		
1-2		0.07*** (0.02)
3-7		0.09*** (0.02)
>7		0.16*** (0.04)
Lives in a flooded municipality (Ref. No)		
Yes		0.03 (0.06)
Any preparedness measure taken before the first flood (Ref. No measure taken)		
Yes		0.06*** (0.01)
Constant	0.16 (0.19)	0.08 (0.24)
Observations	2,383	889

Notes: The Table reports beta-coefficients and, in parenthesis, standard errors. *** p<0.01, ** p<0.05, * p<0.1. Both models include municipality-level fixed effects. Preparedness is measured as a continuous scale using a two-parameter logistic item response theory (2PL IRT) model to estimate a latent trait from individuals' answers among the eleven response items respondents could select in the preparedness questions. We standardized the latent scores to a [0,1] scale using min-max normalization; higher values of the constructed scale indicate greater preparedness.

Looking at *ex-ante* preparedness, we find that, relative to employed individuals, unemployed and inactive respondents are less likely to have adopted preparedness measures before the flood. In addition, separated and divorced invidivuals are less likely to have taken any preparedness measure against extreme climatic events than married individuals. The number of elderly household residents appears to be positively associated with preparedness. This finding is consistent with Zamboni and Martin (2020), who report for households with individuals aged 75 or more to be more likely to meet resource-based preparedness items. We also found for number of years lived in the house to have a stastically significant and positive association with preparedness, with individuals having lived in the house since more than one year being more likely to report having adopted at least one preparedness measure. On the other hand, we find no statistically significant association with preparedness for characteristics such as sex, education, number of children, and type of property. A positive association is rather found between satisfaction with available flood risk information and preparedness, signaling that individuals who report satisfaction with their current flood risk information display higher preparedness for extreme climatic events compared to those who desire additional information. This result is consistent with findings by Xu et al. (2015) and Ashenefe et al. (2017), respectively highlighting a positive influence of risk awareness on preparedness and of knowledge of flood preparedness on flood preparedness.

Concerning *ex-post* preparedness, we find that following the flood events of 2024, individuals whose spouse had died are less likely to report having adopted any preparedness measure, relative to married individuals. On the other hand, parents with one child are significantly more likely than childless individuals to have equipped their house against extreme climatic events, which suggests that parenthood boosted preparedness following two sizeable flood events. This result is consistent with findings by Meagan T. et al. (2018) who, looking at the U.S., found for parenthood to be a significant predictor of emergency preparedness. Importantly, we also find that having experienced a damage from any of the two floods, via a flooding of either the external or internal area of house, is a significant predictor of subsequently choosing to equip the house against extreme climatic events. This results mirrors findings from studies reporting previous disaster experience as a key determinant of preparedness (Xu et al. 2015; Ashenefe et al. 2017; Shapira et al. 2018). Similarly, the number of work days lost because of the floods is positively and statistically significantly associated with preparedness, so that the higher the number of days lost because of the floods, the higher the number of measures adopted to prepare against extreme climatic events. Interestingly, individuals living in flooded municipalities are not significantly more likely than individuals living in non-flooded municipalities to have prepared against extreme climatic events after the flood events. This finding suggests that the direct experience of damages from the flood is a stronger predictor of preparedness adoption than simply residing in the same community where flooding occurred, highlighting the importance of personal impact over community-level exposure. Importantly, *ex-ante* preparedness is positively associated with *ex-post* preparedness: individuals who had adopted any preparedness measure before the 2023 floods are found to be more likely to have adopted measures following the flood events of 2024.

4.2.2 - The impact of the treatments

Descriptive statistics on preparedness against extreme climatic events in the sample show very low levels of preparedness, which raises alarming concerns about the resilience of the Italian population to floods.

We now assess whether providing information on flood risk can affect individuals' risk awareness of the danger of floods, pro-environmental behavior and support for green policies to promote actions that can directly affect the intensity of global warming and thus the likely occurrence of extreme climatic events.

For both surveys, we begin by computing simple mean comparisons using two-sample t-tests across all post-treatment outcome variables. To improve the precision of the estimates, we then estimate treatment effects through regression models that include the full set of covariates that we use in the preparedness regressions. Table 3 reports the t-test results: for each survey and outcome variable, we present the mean in the control group (μ_1), the mean in the treatment group (μ_2), and their difference ($\mu_2 - \mu_1$), which corresponds to the Average Treatment Effect (ATE). By construction, a positive (negative) ATE indicates a higher (lower) mean in the treated group relative to the control group.

Our findings reveal substantial heterogeneity in the impact of the treatment between the baseline and follow-up survey: the text-and-map-based information treatment in the first survey had negligible impacts, whereas the video-based visual treatment in the second survey produced significant behavioral and attitudinal shifts. We therefore focus on the second treatment.

Regarding support for green policies, treated respondents exposed to the video intervention are found to be significantly more likely to support the expansion of electric vehicle use in Italy (ATE = 0.06, p = 0.054) and to report voting intentions favoring political coalitions committed to climate change mitigation (ATE = 4.04, p = 0.051). However, we do not find any significant difference between the treated and the control group regarding willingness to pay for climate policies. Specifically, the video treatment did not affect respondents' support for adding monthly costs to electricity bills, acceptance of higher climate taxes, or agreement with funding climate mitigation through cuts to social benefits, tax increases on high earners, or universal tax increases. Similarly, treated respondents show no higher willingness to accept limitations to their standard of living for climate goals.

For individual behavioral intentions, we observe a statistically significant treatment effect on the likelihood of installing solar panels (ATE = 0.07). Other individual pro-environmental behaviours – including purchasing electric vehicles, improving energy efficiency, reducing meat consumption, and limiting air travel – are unaffected by the treatment. The strongest effects of the treatment appear for outcomes related to the impact of future floods: treated respondents report a statistically significantly higher perceived likelihood of being affected by floods across health and work domains, while no effect is observed on the perceived likelihood that flood events in the next 5 years will affect individuals' relocation plans.

Table 3: Results of t-test (Survey 1 and 2)

	Baseline *Treatment: Map of Italian municipalities by level of hydraulic hazard.*			***Follow-up*** *Treatment: Video on causes, consequences and dangers of floods*		
	μ_1	μ_2	$\mu_2 - \mu_1$ (ATE_1)	μ_1	μ_2	$\mu_2 - \mu_1$ (ATE_2)
Group 1: Support for green policies						
In favor of requiring that 50% of all vehicles sold in Italy by 2030 be electric	0.46	0.45	-0.01	0.32	0.38	0.06*
In favor of requiring that every city use electricity generated from renewable sources, even though this would lead to higher electricity prices	0.72	0.72	-0.00	0.60	0.63	0.04
In favor of increasing taxes on fossil fuels	0.40	0.42	0.02	0.36	0.41	0.04
In favor of increasing government subsidies for renewable energy such as solar and wind power	0.85	0.87	0.02	0.82	0.85	0.03
In favor of banning the sale of home appliances that do not meet energy efficiency standards	0.80	0.77	-0.03*	0.78	0.79	0.01
Likelihood of voting, in the next national elections, for a political coalition that puts combating climate change at the centre of its political agenda	48.52	48.45	0.07	49.01	53.11	4.11**
Perceived likelihood that policies and interventions to cope with the effects produced by extreme climatic events will be put in place in your municipality in the next five years	39.60	40.34	0.74	43.73	44.62	0.89
Perceived likelihood that policies and interventions will be put in place in Italy over the next five years to cope with the effects produced by extreme climatic events	38.62	39.55	0.92	39.22	39.85	0.64
In favor of the proposal of adding a monthly cost to the electricity bill				0.35	0.33	-0.02
How much would the person accept to be charged				1.74	1.81	0.06
In favor of the idea of paying higher taxes to reduce the impact of climate change				0.23	0.21	-0.02
Acceptance of limitations to your standard of living in order to promote climate change mitigation				0.54	0.55	-0.02
Agreement with the idea that more money should be spent on mitigating				0.24	0.25	-0.00

climate change even if it required cuts in social benefits						
Agreement with the idea that more money should be spent on mitigating climate change even if it required tax increases for people with high incomes				0.62	0.61	-0.01
Agreement with the idea that more money should be spent on mitigating climate change even if it required tax increases for all				0.15	0.15	-0.01
Group 2: Willingness to take individual actions						
Intends to install solar panels	0.56	0.59	0.03	0.44	0.51	0.07*
Intends to buy an electric car	0.51	0.51	0.00	0.40	0.42	0.02
Intends to increase their house energy efficiency	0.78	0.78	0.01	0.76	0.76	-0.00
Intends to reduce meat consumption	0.45	0.50	0.05	0.44	0.40	-0.04
Intends to reduce number of airplanes taken	0.30	0.36	0.00	0.30	0.36	0.06
Group 3: Expectation of flood risk						
Likelihood that you and the people you live with will be affected by floods in the next five years on work	25.64	26.84	1.20	29.02	33.07	4.05**
Likelihood that you and the people you live with will be affected by floods in the next five years on health	26.70	27.35	0.65	29.88	35.23	5.35***
Likelihood that you and the people you live with will be affected by floods in the next five years on decision to move house	21.22	21.72	0.50	24.22	26.03	-1.81

Source: Authors' elaborations on primary data.
Notes: μ_1 and μ_2 refer, respectively, to the means for the untreated and the treated group. Consequentially, the difference $\mu_2 - \mu_1$ refers to the refers to the average treatment effect (ATE), representing the difference in mean outcomes between the treatment and control groups. *** p<0.01, ** p<0.05, * p<0.1.

The regression results in Table 3 show the impact of the video treatment when controlling for demographics, flood experience, and municipality fixed effects: they confirm the t-test results and strengthen several key findings. Most notably, the treatment effect on climate voting intentions increases from 4.11 to 5.26 percentage points and remains statistically significant. An increase is also observed for individuals' intention to install solar panels. The treatment effect on work- and health-related flood risk perceptions suggests that the video successfully increased participants' awareness of personal vulnerability to climate risks across multiple life domains. This enhanced risk perception appears to serve as a crucial mechanism linking flood risk communication to both political preferences and individual behavioral intentions, suggesting that effective climate messaging should aim at making abstract environmental threats feel personally relevant and consequential.

Table 4 – Results of linear regression models (Second treatment)

Group 1	
In favor of requiring that 50% of all vehicles sold in Italy by 2030 be electric	0.04 (0.04)
In favor of requiring that every city use electricity generated from renewable sources, even though this would lead to higher electricity prices	0.02 (0.04)
In favor of increasing taxes on fossil fuels	0.05 (0.04)
In favor of increasing government subsidies for renewable energy such as solar and wind power	0.04 (0.03)
In favor of banning the sale of home appliances that do not meet energy efficiency standards	0.02 (0.03)
Likelihood of voting, in the next national elections, for a political coalition that puts combating climate change at the centre of its political agenda	5.26** (2.43)
Perceived likelihood that policies and interventions to cope with the effects produced by extreme climatic events will be put in place in your municipality in the next five years	-0.63 (1.94)
Perceived likelihood that policies and interventions to cope with the effects produced by extreme climatic events will be put in place in Italy in the next five years	0.42 (1.92)
In favor of the proposal of adding a monthly cost to the electricity bill	0.01 (0.04)
In favor of the idea of paying higher taxes to reduce the impact of climate change	-0.02 (0.03)
Acceptance of limitations to your standard of living in order to promote climate change mitigation	0 (0.04)
Agreement with the idea that more money should be spent on mitigating climate change even if it required cuts in social benefits	0.02 (0.03)
Agreement with the idea that more money should be spent on mitigating climate change even if it required tax increases for people with high incomes	-0.03 (0.04)
Agreement with the idea that more money should be spent on mitigating climate change even if it required tax increases for all	0.01 (0.03)
Group 2	
Intends to install solar panels	0.10** (0.04)
Intends to buy an electric car	0.06 (0.04)
Intends to increase their house energy efficiency	0.04 (0.05)
Intends to reduce meat consumption	-0.01 (0.07)
Intends to reduce number of airplanes taken	0.11* (0.06)
Group 3: Expectation of flood risk	
Likelihood that you and the people you live with will be affected by floods in the next five years on work	3.18* (1.87)
Likelihood that you and the people you live with will be affected by floods in the next five years on health	3.80** (1.84)

Likelihood that you and the people you live with will be affected by floods in the next five years on decision to move house	1.29 (2.00)

Source: Authors' elaborations on primary data.
Note: All models control for sex, marital status, education, employment status, net monthly income, number of children, flood damage experience, flood-related relocation, and work days lost due to the flood. Full models including all coefficients are provided in Appendix. *** p<0.01, ** p<0.05, * p<0.1.

5. Discussion and conclusion

With devastating floods projected to become more frequent and intense, and the expectation of increases in flood hazard over the course of the 21st century (Garcia-Valdecasas Ojeda *et al*. 2024), monitoring and improving preparedness of flood-prone regions and their populations is crucial. Yet, the literature on preparedness against floods is relatively small and does not provide a consistent picture of the determinats of preparedness because of the lack of a clear definition of preparedness against floods, and identification strategies that do not allow understanding the interplay between various socio-demographic, psychological, and contextual factors to develop more effective preparedness strategies.

We fill these gaps by developing an original survey instrument to study risk awareness and preparedness against floods in Italy, one of the most floods affected countries in Europe. We fielded the survey to a representative population of residents in the Italian regions of Emilia Romagna and Tuscany in May and November 2023. In December 2024, after the devastating floods that hit Italy again, we fielded a follow-up survey, creating a panel dataset for respondents who participated in both surveys, which allows examining changes in preparedness over time. We find that residents of both Emilia-Romanga and Tuscany were highly unprepared against floods, and report that they would have acted differently had they known their home was at risk of flooding. Having suffered damages from the flood and having lost work days are key drivers of preparedness against floods: respondents who had suffered any damage to their house following the 2024 flood were 2.8 times more likely to report having taken any preparedness measure following the extreme climatic events at the end of 2024.

Each survey also included a pre-registered experiment where we randomly primed information on the severity and intensity of flood risk to assess the impact of this priming on several outcomes, including flood risk awareness, perceptions of climate change, support for policies to fight climate change, pro-environmental behaviour, and voting choices. Consistently with a low level of preparedness and a demand to improve floods risk's communication, we find that providing information on flood risk through a visually effective video message positively affects individuals' awareness of the danger of floods and their impacts on health and work, pro-environmental individual actions, and the intention to vote for a political coalition that will prioritize on combating climate change. Confirming the findings of Binelli, Loveless and Shaffner (2023), we thus find that providing information on floods' risk can act as a catalyst to promote climate action, which can in turn contribute to reducing the incidence of extreme climatic events and the impact of climate change in the long run.

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Appendix

Figure A1 – Comparison between preparedness before the flood events of May and November 2023 (Preparedness in survey 1) and after the flood events of September and October 2024 (Preparedness in survey 2).

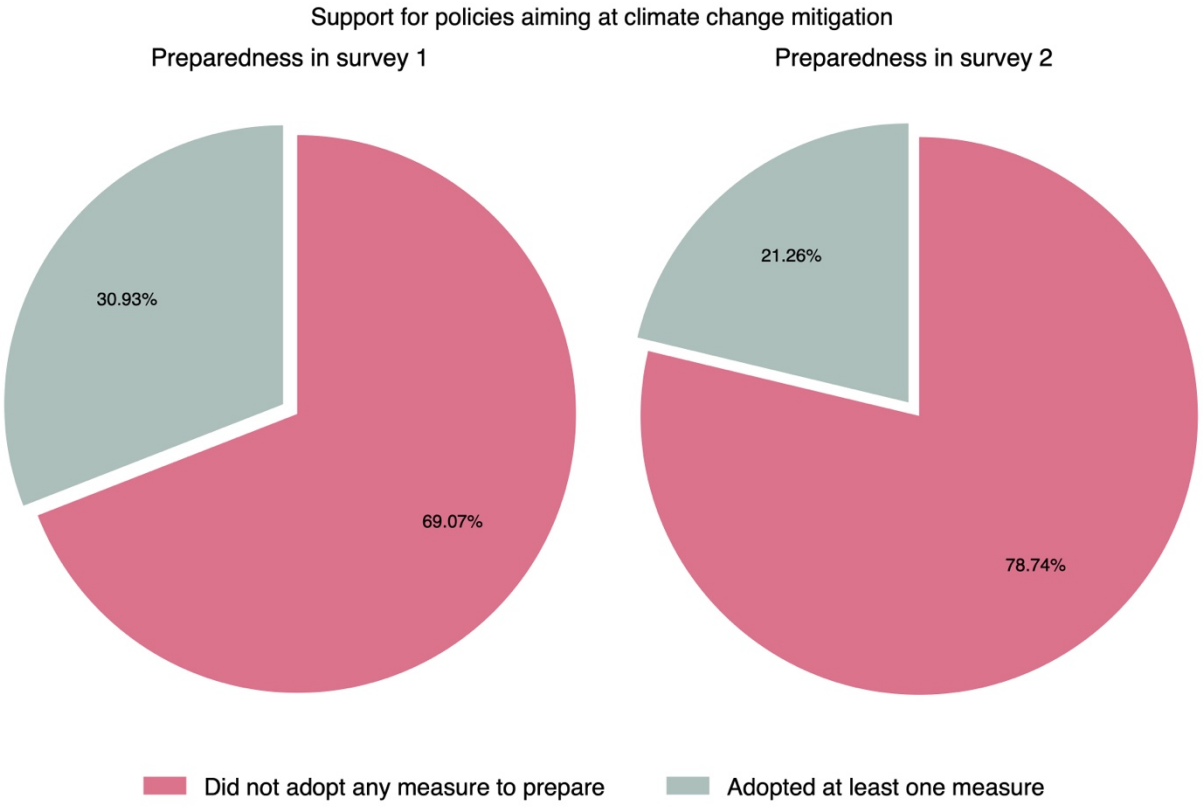
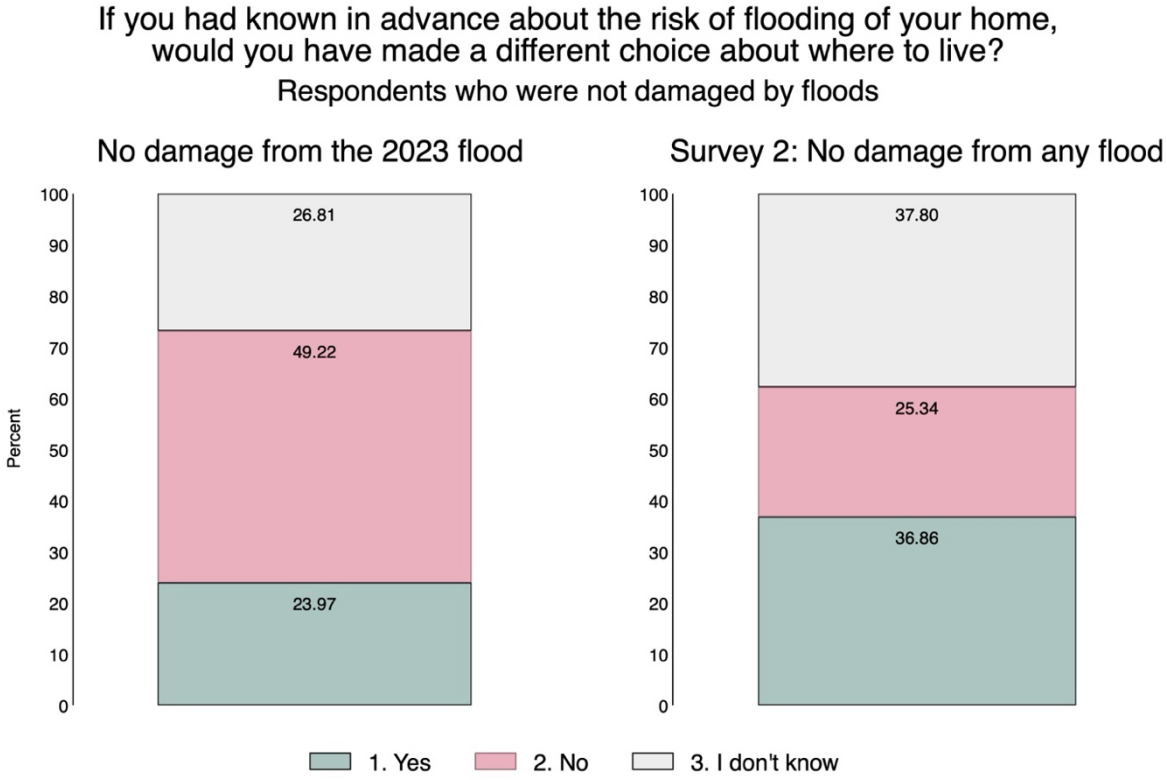
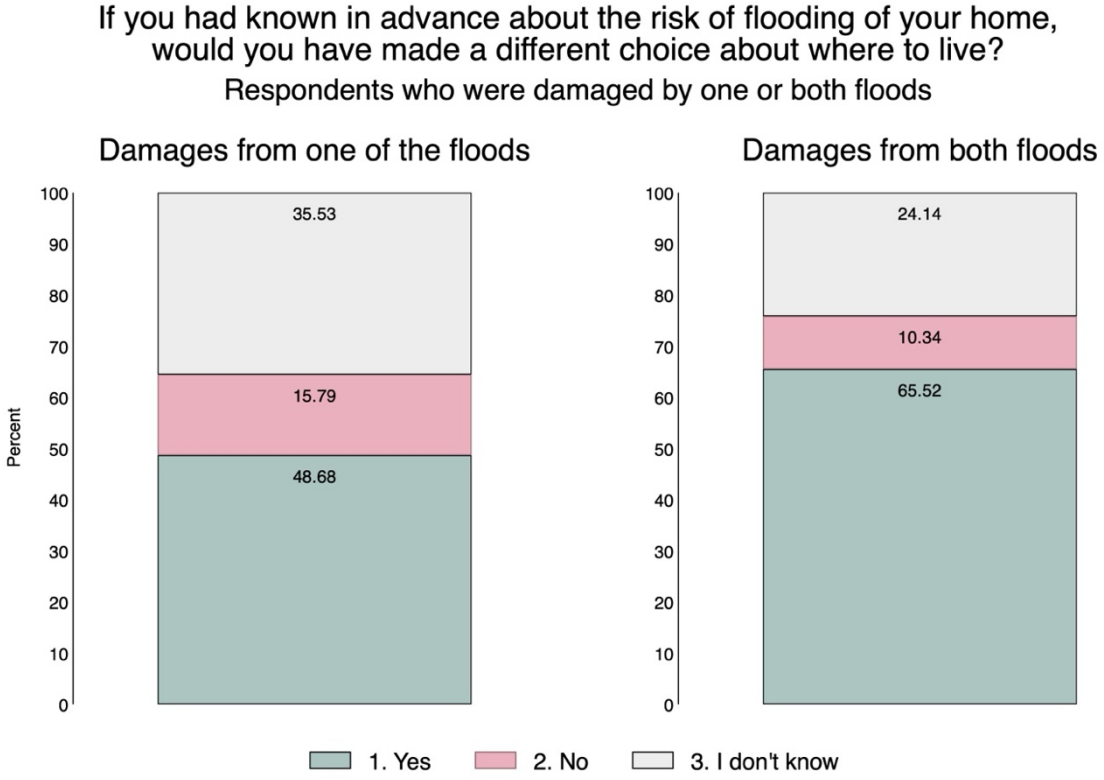


Figure A2 – Percent Distribution of Choice of Where to Live if Knowing In Advance Floods Risk

Panel A

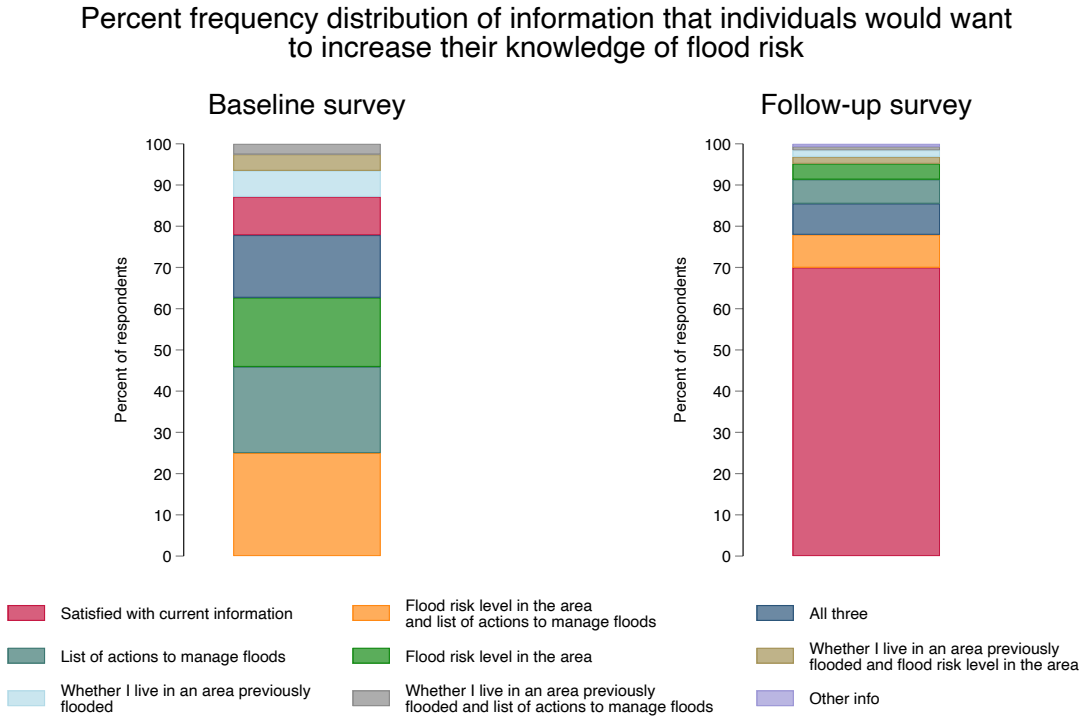


Panel B



Source: Authors' elaborations on primary data.

Figure A3 – Information to Increase Understanding of Floods Risk

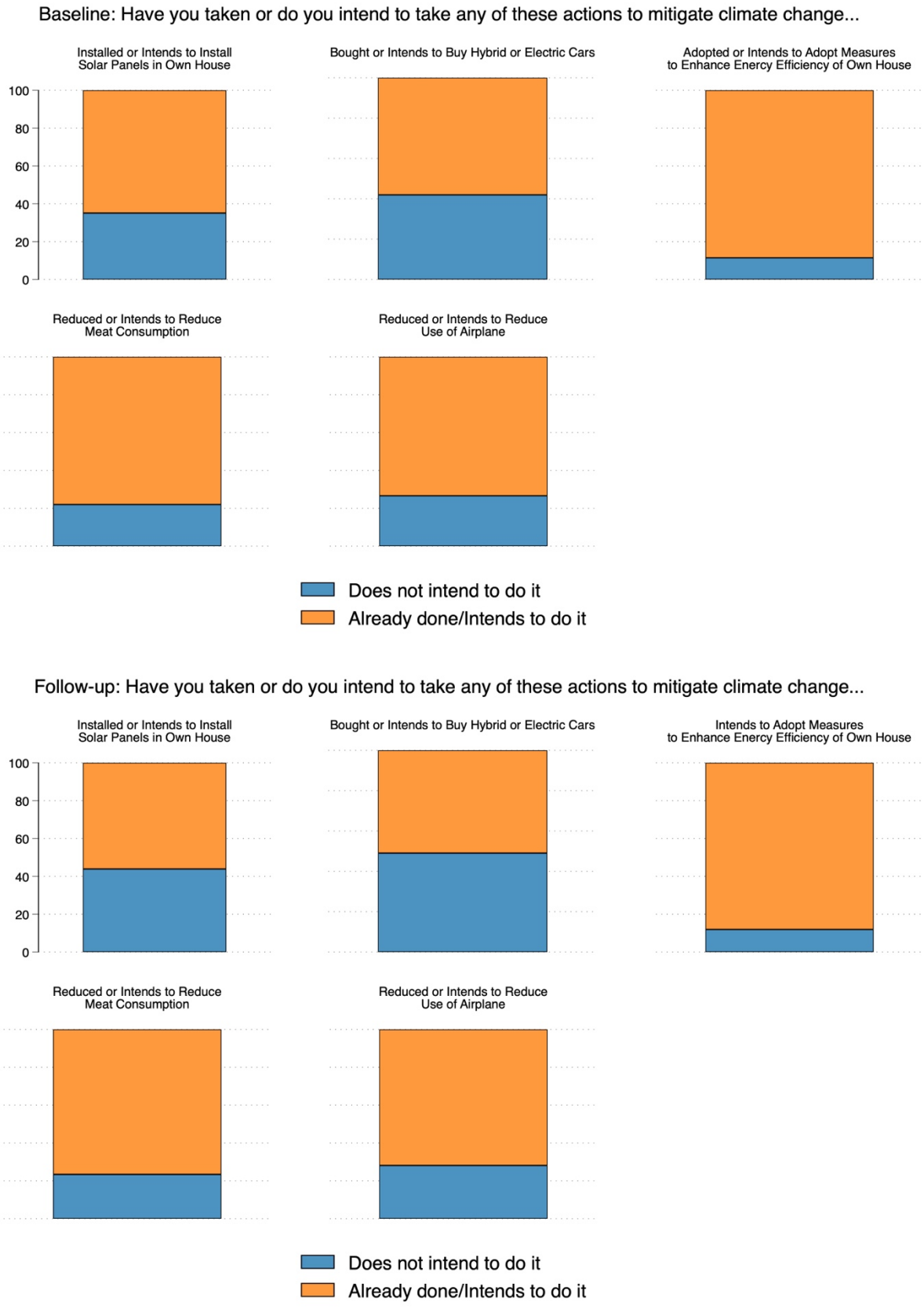


Source: Authors' elaborations on primary data.

Figure A4 – Support for policy interventions to mitigate climate change

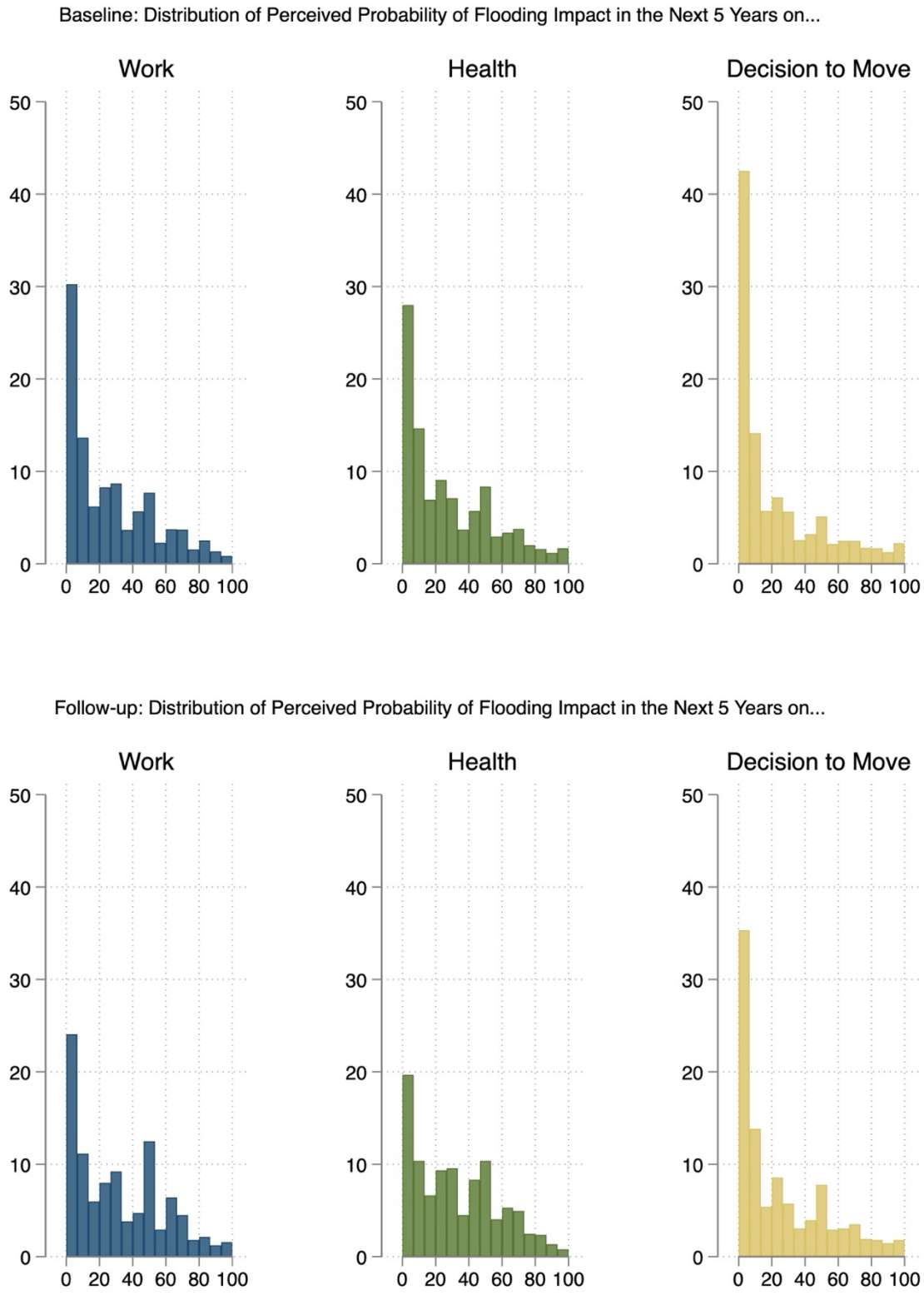
Source: Authors' elaborations on primary data.

Figure A5 – Intention or to act or actions already taken to mitigate climate change in Wave 1



Source: Authors' elaborations on primary data.

Figure A6 – Perception of probability of being impacted by flood in the next 5 years in the realms of work, health, and decision to move



Source: Authors' elaborations on primary data.

Figure A7 – Distribution of agreement with the idea of an increase in the monthly electricity bill to combat climate change and availability of amount to pay

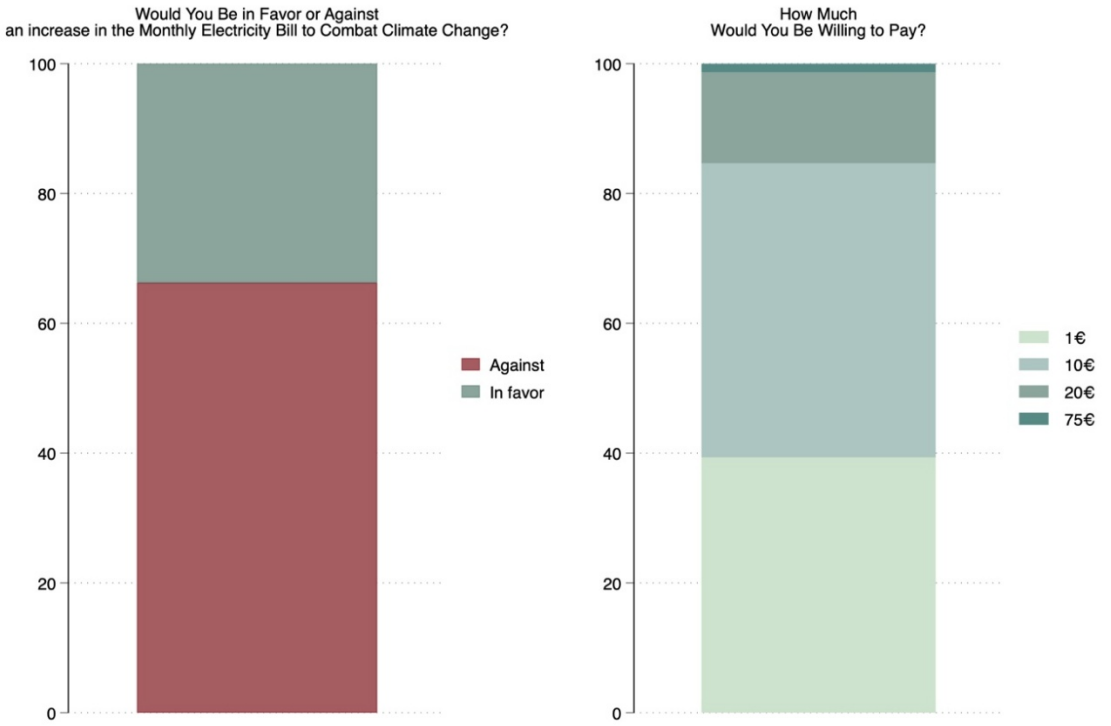
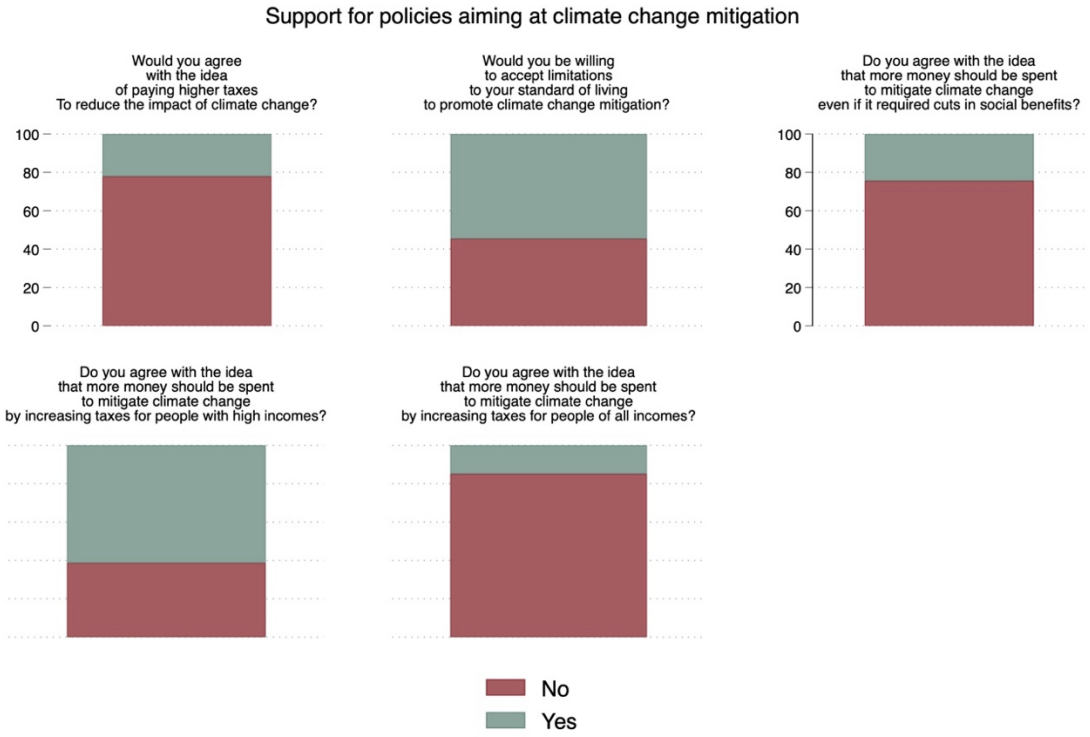


Figure A8 – Willingness to fund climate change mitigation through taxes, lifestyle changes, and targeted spending policies.



Source: Authors' elaborations on primary data.

Effects of treatment

Table A1 – Results of linear regression models: First treatment

	Support for green policies	Likelihood of voting for a party that puts combating climate change at the center of its political agenda	Willingness to take personal actions to address climate change	Perceived likelihood of being impacted by floods in the next 5 years
Treatment	-0.00	-0.30	0.01	1.22
	(0.01)	(1.38)	(0.01)	(0.94)
Sex (Ref. Male)				
Female	0.05***	2.60*	0.01	1.46
	(0.01)	(1.43)	(0.01)	(0.97)
Marital status (Ref. Single/Unmarried)				
Married	-0.04**	-4.95***	-0.03**	-0.21
	(0.02)	(1.84)	(0.01)	(1.25)
De facto or legally separated/Divorced	-0.03	-4.04	-0.09***	-5.32***
	(0.03)	(2.95)	(0.02)	(2.00)
Widow	0.04	-3.37	-0.10**	-9.79**
	(0.06)	(5.98)	(0.05)	(4.06)
Education (Ref. Middle School or lower)				
High school diploma	0.01	5.58**	0.01	-2.86
	(0.02)	(2.61)	(0.02)	(1.77)
Bachelor degree or higher	0.07***	10.66***	0.04*	-1.30
	(0.03)	(2.74)	(0.02)	(1.86)
Employment status (Ref. Working)				
Unemployed	0.01	3.51	0.02	-1.55
	(0.03)	(2.72)	(0.02)	(1.84)
Student	0.06**	9.06***	0.05**	1.98
	(0.03)	(2.76)	(0.02)	(1.87)
Retired	0.01	3.79	-0.02	-7.17***
	(0.02)	(2.43)	(0.02)	(1.65)
Inactive (Not working nor looking for work)	-0.03	-3.08	-0.10***	-10.59***
	(0.04)	(3.75)	(0.03)	(2.54)
Net monthly income (Ref. < 1,001)				
1,001 to 1,500 euros	0.00	3.57	0.03	-5.44**
	(0.04)	(4.02)	(0.03)	(2.73)
1,501 to 2,000 euros	-0.00	0.37	0.05	-3.98
	(0.04)	(3.86)	(0.03)	(2.61)
2,001 to 3,000 euros	0.01	0.22	0.06*	-5.97**
	(0.04)	(3.77)	(0.03)	(2.55)
3,001 to 5,000 euros	0.04	2.06	0.07**	-7.31***
	(0.04)	(3.84)	(0.03)	(2.60)
5,001 to 10,000 euros	0.03	-6.27	0.07**	-7.52**

	(0.04)	(4.39)	(0.04)	(2.97)
More than 10.000 euros	-0.02	-1.95	0.08**	2.83
	(0.04)	(4.33)	(0.03)	(2.94)
Don't know	-0.01	-0.71	0.05	-3.72
	(0.04)	(4.11)	(0.03)	(2.78)
N. of children (Ref. Childless)				
1	0.02	0.97	0.04**	-0.77
	(0.02)	(1.95)	(0.02)	(1.32)
2	0.02	1.88	0.05***	-0.86
	(0.02)	(2.13)	(0.02)	(1.45)
3. 3 or more	-0.00	-1.54	0.00	-0.21
	(0.06)	(6.78)	(0.05)	(4.60)
Got damaged by the 2024 flood (Ref. No)				
Yes	0.03	4.57*	0.01	5.71***
	(0.02)	(2.34)	(0.02)	(1.58)
Had to relocate because of the 2024 flood (Ref. No)				
Yes	0.00	-1.42	-0.01	-1.83
	(0.02)	(1.65)	(0.01)	(1.12)
N. of work days lost because of the flood (Ref. None)				
1-2	-0.01	2.72	0.06***	5.76***
	(0.02)	(2.25)	(0.02)	(1.52)
3-7	-0.03	1.35	0.06***	15.39***
	(0.03)	(2.90)	(0.02)	(1.96)
>7	-0.02	-0.95	0.07**	13.42***
	(0.04)	(3.94)	(0.03)	(2.67)
Constant	0.72**	15.17	0.51**	1.37
	(0.29)	(30.66)	(0.25)	(20.77)
Observations	2,244	2,244	2,244	2,244

Source: Authors' elaborations on primary data.
Notes: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2 – Results of linear regression models: Second treatment

	Support for green policies	Likelihood of voting for a party that puts combating climate change at the center of its political agenda	Willingness to take personal actions to address climate change	Perceived likelihood of being impacted by floods in the next 5 years
Treatment	0.03	5.23**	0.03*	2.76*
	(0.02)	(2.51)	(0.02)	(1.61)
Sex (Ref. Male)				
Female	0.05**	2.63	0.03*	2.92*
	(0.02)	(2.64)	(0.02)	(1.70)
Marital status (Ref. Single/Unmarried)				
Married	-0.02	2.11	-0.02	-4.76**
	(0.03)	(3.69)	(0.03)	(2.37)
De facto or legally separated/Divorced	0.01	1.42	-0.10**	-4.56
	(0.05)	(5.72)	(0.04)	(3.67)
Widow	0.05	6.00	-0.15**	-13.50**
	(0.09)	(9.73)	(0.07)	(6.25)
Education (Ref. Middle School or lower)				
High school diploma	-0.03	-0.89	-0.03	-7.00**
	(0.05)	(5.05)	(0.04)	(3.24)
Bachelor degree or higher	0.04	8.86*	0.02	-2.98
	(0.05)	(5.18)	(0.04)	(3.33)
Employment status (Ref. Working)				
Unemployed	0.01	7.45	-0.01	-0.04
	(0.05)	(5.89)	(0.04)	(3.78)
Student	0.20***	11.53**	0.12***	7.99**
	(0.05)	(5.65)	(0.04)	(3.63)
Retired	0.00	1.27	0.05*	-7.15***
	(0.03)	(3.72)	(0.03)	(2.39)
Inactive (Not working nor looking for work)	0.01	-4.49	0.01	-3.56
	(0.07)	(7.30)	(0.06)	(4.69)
Net monthly income (Ref. < 1,001)				
1,001 to 1,500 euros	0.02	7.46	0.04	-3.32
	(0.08)	(8.53)	(0.07)	(5.48)
1,501 to 2,000 euros	0.02	10.37	0.09	-2.13
	(0.07)	(7.77)	(0.06)	(4.99)
2,001 to 3,000 euros	0.05	10.86	0.08	-3.61
	(0.07)	(7.62)	(0.06)	(4.89)
3,001 to 5,000 euros	0.04	10.88	0.10*	-2.49
	(0.07)	(7.80)	(0.06)	(5.01)
5,001 to 10,000 euros	0.11	8.19	0.12*	-5.46
	(0.08)	(9.00)	(0.07)	(5.78)
More than 10.000 euros	0.04	3.12	0.11	-6.96
	(0.08)	(8.94)	(0.07)	(5.74)

Don't know	-0.00	8.82	0.07	-1.85
	(0.08)	(8.14)	(0.06)	(5.23)
N. of children (Ref. Childless)				
1	0.04	0.30	0.07***	2.58
	(0.04)	(3.77)	(0.03)	(2.42)
2	0.02	-2.51	0.03	1.66
	(0.03)	(3.75)	(0.03)	(2.41)
3. 3 or more	0.03	-17.89	-0.05	3.95
	(0.14)	(15.24)	(0.12)	(9.79)
Got damaged by any of the two floods flood (Ref. No)				
Yes	-0.00	0.55	0.00	5.37**
	(0.04)	(4.06)	(0.03)	(2.61)
	-0.06	4.01	0.02	15.99***
	(0.07)	(7.44)	(0.06)	(4.78)
Had to relocate because of the 2024 flood (Ref. No)				
Yes	-0.09***	-4.35	-0.02	-1.84
	(0.03)	(3.18)	(0.02)	(2.04)
N. of work days lost because of the flood (Ref. None)				
1-2	0.06	5.51	0.10***	7.16***
	(0.04)	(3.81)	(0.03)	(2.45)
3-7	0.04	-1.16	0.12***	14.06***
	(0.05)	(5.00)	(0.04)	(3.21)
>7	0.01	10.47	0.10*	14.05***
	(0.07)	(7.29)	(0.06)	(4.68)
Municipality was hit by the 2024 flood (Ref. No)				
Yes	0.12	4.45	-0.05	1.57
	(0.13)	(14.16)	(0.11)	(9.09)
Constant	0.56*	79.27**	0.39	10.62
	(0.30)	(32.60)	(0.25)	(20.94)
Observations	855	855	855	855

Source: Authors' elaborations on primary data.
Notes: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1.