

Report 2023:04

How prepared are Norwegian homeowners to implement climate mitigation measures?

Mikkel Vindegg
Marit Klemetsen
Tom Erik Julsrud
Sofie Skjeflo

Tittel	How prepared are Norwegian homeowners to implement climate mitigation measures?
Forfattere	Mikkel Vindegg, Marit Klemetsen, Tom Erik Julsrud og Sofie Skjeflo
Abstract	<p>The aim of the report is to identify target groups and segments of homeowners susceptible to responding differently to the opportunity to adapt their property to heavy rain and flooding. The findings will aid the selection of assessment criteria to draw target group profiles, and a more tailored communication strategy per segment. The first part of this report presents descriptive statistics, indicating people's concerns for climate change and damages, their understanding of own responsibility and interests for taking measures. The second part presents results from qualitative interviews with employees in the insurance industry (claim handlers, salespeople, and appraiser) and presents their views on insurance customers' awareness of climate change and preparedness for surface water risks and damages</p>
Quality manager	Frode Longva
Utgiver	CICERO
Sted og dato	Oslo, Juni 06, 2023
Finansieringskilde	Regionale Forskningsfond Oslo
Oppdragsgiver	Mitigrate AS
Prosjekt	Automated approach to adapt properties to climate change
Prosjektleder	Tom Erik Julsrud
Forsidebilde	Istockphoto

Contents

Preface	2
Results summary	3
Part 1: Population surveys	3
A clear majority of the respondents is concerned about climate chan	3
Part 2: Interviews with employees in insurance companies	5
1. Survey results: The Citizen's panel survey and CICERO's climate survey	8
1.1 Methodology and data	8
1.2 Concern for climate change	9
1.3 Concerns for property damage	19
1.4 Who are responsible for adaptation measures?	21
1.5 Incentivizing measures to reduce risk	31
1.6 Are the authorities doing enough?	33
2. Results from qualitative interviews with insurance employees	40
2.1 Introduction and methods	40
2.2 Limited preparedness for flooding and urban runoff	41
2.3 Mixed interest for climate change among insurance industry employees	42
2.4 Individualising insurance: currently limited by administrative costs	43
2.5 Salespeople are adaptable, but selling new products requires sales system integration and statistics are useful in informing and convincing customers	44
2.6 Barriers for implementing preventative measures	45
2.7 Competition between insurance companies: Mainly carrots, few sticks	46
2.8 People living close to rivers experience higher risk	47
2.9 On future developments in the insurance industry	47
3. Discussion	49
3.1 Responsibilities and incentives for implementing mitigation measures	49
3.2 Knowledge and guidance to take actions.	50
3.3 Balancing individualization and perceived fairness	51
Referanser	52
Appendix	54

Preface

This report is written as part of the project Automated approach to adapt properties to climate change, managed by the climate risk mitigation company Mitigate. The project has received funding from the Oslo Regional Research Fund (RRF Oslo). Marit Klemetsen has conducted the work in chapter 2 with assistance from Sofie Skjeflo, and Mikkel Vindegg and Tom Erik Julsrud have conducted the work in chapter 3. Julsrud has been responsible for the project at CICERO and Laurent Feuilleaubois has been responsible for the project at Mitigate.

The aim of the project is to identify target groups and segments of homeowners susceptible to responding differently to the opportunity to adapt their property to heavy rain and flooding. The findings will aid the selection of assessment criteria to draw target group profiles, and a more tailored communication strategy per segment. This analysis was followed up by qualitative interviews with employees in the insurance industry. The first part of this report presents descriptive statistics from two different surveys: the Norwegian Citizen Panel (medborgerpanelet), run by the University of Bergen and NORCE, as well as CICERO's climate survey from the project ACT ("From targets to action: public responses to climate policy instruments," funded by the Research Council of Norway (RCN). The second part presents results from qualitative interviews with employees in the insurance industry (claim handlers, salespeople, and appraiser). The intention here is to give more in-depth knowledge about insurance customers' awareness of climate change and preparedness for surface water risks and damages. In the final section we draw on results from both these datasets to give some general recommendations for how the interest for implementing climate mitigation measures among homeowners can be improved.

Results summary

This section summarizes key results from the statistical analysis (part 1) and the qualitative interviews (part 2).

Part 1: Population surveys

This part summarises descriptive statistics on survey respondents' attitudes to the consequences of climate change, climate adaptation measures, and views on responsibilities. We use data from two different surveys: the Norwegian Citizen Panel and CICERO's climate survey (ACT), with results from 1500 - 1900 respondents in the Norwegian Panel from three rounds of the survey, and about 4900 respondents from CICERO's climate survey in 2021.

A clear majority of the respondents is concerned about climate change

8 out of 10 respondents in CICERO's climate survey are concerned about climate change to some degree. In 2021, only 16% of the respondents are not concerned at all. Periods with a lot of rain is considered as the most crucial event. The view of the majority is thus in line with science. Almost half of the population believe we already see serious negative consequences in Norway, and almost 4 out of 10 report that they have experienced what they believe are consequences of climate change. A clear majority expects their municipality to be negatively affected to some degree by climate change over the next ten years.

The responsibilities of municipalities, private businesses and households are underestimated

Several actors in Norway have responsibilities in securing preparedness against the consequences of climate change. The municipalities have a key role and are responsible for planning and preparedness. The central government (including national bodies) is responsible for obtaining, systematizing, and facilitating knowledge for the municipalities. The county administrations and county governors also have responsibilities. Private businesses and households have a responsibility to prevent or limit the extent of the damage, through e.g., maintenance.

The Norwegian Citizen Panel from 2020 shows that 9 out of 10 respondents view the central government as responsible, whereas only 5 out of 10 regard the municipalities as responsible. Furthermore, only 4 out of 10 view private businesses and households as responsible. A possible explanation for the low share of people perceiving the municipalities, private businesses, and households as responsible is confusion about the distribution of climate change adaptation responsibilities. Another possibility is that some of the respondents have interpreted the question as normative, believing that the central government *should* take more responsibility than today.

A large majority is able to take own risk mitigation measures

8 out of 10 respondents in the Norwegian Citizen Panel from 2020 acknowledge that they themselves can take measures to protect their property against the consequences of climate change. This is twice as many as the share that view households as a responsible actor. This indicates that a lot of respondents can undertake measures even if the majority do not acknowledge that they have such a responsibility.

8 out of 10 support increased adaptation efforts

8 out of 10 respondents in the same survey believe that the government should increase their preparedness efforts against the direct local consequences of climate change, even if this means less funding for other important local issues. The same share believes we should do more to prevent the indirect consequences of climate change, such as preventing negative impacts on food production.

Low trust in authorities to deal with climate adaptation

5 out of 10 respondents in the Norwegian Citizen Panel from 2021 trust that the authorities *will* take the necessary climate adaptation measures. The level of trust in government appears to be significantly lower for climate adaptation compared to the general level of government trust.

Age differences: older age groups are less concerned but more positive to measures

Young respondents are more concerned about climate change, and they report that they have experienced what they perceive as climate change slightly more often than the older age groups. Compared to their younger counterparts, respondents over 60 attribute responsibility for climate adaptation to actors other than the central government level less often. Nevertheless, older age groups more often agree that they can undertake measures to protect themselves against the consequences of climate change, and that the authorities should increase the climate adaptation efforts. Older age groups may be particularly positive to climate adaptation measures in the context of general maintenance or general emergency preparedness, or as they tend to have more responsibilities in terms of house ownership.

Regional differences: climate concern higher in Oslo, but people in the south more willing to take own measures

Respondents in Oslo are more concerned about climate change than those in the eastern (excluding Oslo), southern, western, and northern parts of Norway, as well as Trøndelag. A higher share of the Oslo respondents also believe that we are already experiencing serious negative consequences of climate change in Norway. Across all regions, the vast majority view the central government as responsible for climate change adaptation. However, a higher share of the respondents in Oslo also assign responsibility to the municipalities and private businesses. In the south of Norway, a higher share of the respondents is willing to take measures to protect themselves against the consequences of climate change. The respondents in the south also report a higher degree of trust in the authorities to take the necessary measures.

Difference among income groups: higher income groups assign more responsibility to private households

Respondents in the highest income group are less concerned about climate change, whereas those in the lowest income group are most concerned. Among the highest income group, a lower share believe that we are already experiencing serious negative consequences of climate change, compared with other income groups. A vast majority in all income groups view the central government as responsible for climate adaptation. However, the share of respondents believing that private households are responsible as well increases with income. The two highest income groups are more willing to take measures to protect themselves and their property against climate change than the other income groups. Respondents around the average income level report the highest trust in the authorities to take the necessary measures.

Gender difference: women are more willing to take their own measures than men

Female respondents are more concerned about climate change than male respondents. A larger share of female respondents also believe that we already experience serious negative consequences of climate change in Norway. A large majority of both male and female respondents perceive the central government to be responsible for climate change adaptation, and about half of both male and female respondents also view the municipalities as responsible. However, women tend to view private businesses and households as responsible more often as well, compared to men. Women are also more inclined than men to agree that they can take measures to protect themselves against the consequences of climate change. Most men and women believe that the authorities should increase their efforts, but women report slightly higher levels of trust in the authorities on this issue.

Difference among education levels: higher education groups are more aware of the shared responsibilities

Highly education groups are more concerned about climate change compared to those with lower levels of education. Moreover, a larger share of respondents with higher education believe we already see serious negative consequences of climate change in Norway. A vast majority of all education groups view the central government as responsible for climate change adaptation, but the respondents with higher education more often perceive municipalities, private businesses, and households as responsible as well. A higher share of the respondents with higher education agrees that the authorities must increase preparedness efforts, compared to those with lower education.

Part 2: Interviews with employees in insurance companies

The following summarises findings from nine qualitative interviews with employees of three different companies from the insurance industry.

Customers have limited knowledge about insurance terms and coverage

Insurance is a «low-interest product»: few customers go into the term details and often simply assume that «they are covered». However, there is recognition that insurance documents may be more complex than they need to be, and at times it is difficult even for employees who have worked with insurance for a long time to judge whether a particular case is covered or not.

The general impression is that customers' preparedness for flooding and urban runoff [FUR] is low

Awareness of connections between insurance and climate is generally low (with some exceptions), as is the technical knowledge needed to implement preventative measures. However, a distinction was also made in one case between people in urban and rural, with people in rural areas being described as more proactive. In another case, farmers were mentioned as especially willing and able to implement their own mitigation measures.

There is also mixed interest for climate change among insurance industry employees

Currently, there seems to be little systematic incorporation/institutionalisation of climate change concerns in the everyday work of private home insurance. This makes for potentially large variations in what role climate change plays during contact with customers, and the extent to which employees work to make customers aware of potential climate-related issues through more informal dissemination of knowledge.

Individualisation of insurance is currently limited by administrative costs

The degree of individual tailoring of private property insurance, in terms of both premiums and coverage is generally very limited. This also limits opportunities to price risk mitigation measures into reduced premiums, for example. The latter was reported as frustrating for some of the most proactive customers who thought it unfair that they should pay exactly the same premiums as people who had done nothing to mitigate FUR risk.

Salespeople are adaptable, but new products require sales-system integration; statistics are useful in relation to customers

Salespeople are generally willing and able to sell different types of coverage in different ways, but it needs to be integrated into their systems in order for them to use it as a selling point. As of now, it is still limited what can be incorporated in terms of climate related issues which consequently limits the use of climate change issues as a topic in sales situations. Additionally, statistics were mentioned as important to provide insurance sellers with arguments to present to the customers.

Barriers for implementing preventative measures for FUR

Appraisers and claim handlers are generally wary about being specific in their recommendations about preventative measures to avoid liability. Both claim handlers and appraiser do not necessarily have the technical expertise to advise customers when it comes to specifics of preventative measures. If the solution does work, or turns out to be unnecessary, the insurance company risks angering their customers or even having to take responsibility for covering the costs of a failed mitigation measure. Here, availability of information is also an issue, as technical catalogues or magazines that are available to appraiser are not open to customers, which limits their use as a potential third-party source of information on solutions.

Competition between insurance companies means they are limited to mainly "carrots" with few "sticks"

Competition between insurance companies was consistently mentioned as a barrier to any one company raising premiums or limited coverage on the back of the reported

state of a property, because it will lead to customers switching insurance provider to a rival. This limits individualisation to “positive reinforcement” (i.e. carrots, not sticks) for implemented measures, yet as mentioned above, such measures are currently not common in private property insurance general.

At-risk groups and areas

When asked about whether there were any customer groups that stood out as particularly at risk or more or less aware of climate change etc., the immediate response was limited, which indicates that there are few such groups that stand out very clearly. However, the broadest group of at-risk people mentioned was those living close to a river (e.g. in Lillestrøm and near the major rivers inland). This increases risk of flooding but is also difficult and costly for private property owners to implement preventative measures against. The municipality would have to take charge, which was reported as unlikely in most cases (although some municipalities are much more on the front foot about adaptation measures than others)

Future developments in the insurance industry

When asked an open question about future developments in the insurance industry, the following themes were most prominent:

- Automation and digitalisation are expected to increase in the industry
- Premiums and deductibles are expected to increase due to increased climate risk
- There will be more individualised insurance and this will in turn require more developed systems for segmentation of the customer base
- Insurance companies will have an increased need for understanding why incidents happen and try to learn from FUR incidents

1. Survey results: The Citizen's panel survey and CICERO's climate survey

1.1 Methodology and data

This section summarizes some key figures relating to climate change adaptation from two different surveys targeting Norwegian citizens: the Norwegian Citizen Panel and CICERO's climate survey.

The Norwegian Citizen Panel is a web-based survey of Norwegians' opinions toward important societal matters, led by researchers from the University of Bergen and NORCE. The participants are recruited to represent a cross-section of the Norwegian population.¹ We use three rounds of data collected in November 2020, November 2021 and November 2022. The two first rounds of data are currently available from the Norwegian Agency for Shared Services in Education and Research, while the final round from November 2022 will be made available shortly. We report results from a part of the Norwegian Citizen Panel that is developed and funded by NORADAPT, and published as a part of *Norsk klimamonitor - the Norwegian climate monitor*.² The project collects data from the private and public sectors as well as individual citizens, with the purpose of contributing to improved information about climate adaptation in the Norwegian society.

CICERO's climate survey (ACT - From targets to action: public responses to climate policy instruments)³ is a survey conducted annually since 2018. The ACT data are collected each spring by Kantar, using methods to ensure representativity, and contains around 4000 respondents each year. The population is stratified by age, gender, residence, and level of education prior to the sample selection.

In most questions, the respondents are asked about the degree to which they agree ('partly agree/disagree' 'agree/disagree' or 'strongly agree/disagree') with different statements presented in the questionnaire (the Norwegian Citizen Survey), or whether a

¹ <https://www.uib.no/en/citizen>

² <https://klimamonitor.no/om-klimamonitor>

³ <https://cicero.oslo.no/no/prosjekter/act-fra-klimamal-til-handling-folks-respons-pa-virkemidler-for-utslippskutt>

statement matches (very or quite) good or (very or quite) bad with their own opinion (CICERO's climate survey).⁴ To help avoid forcing people to take a stand, a middle category is included where people can answer "neither/nor", and in some questions a "don't know" category is included as well.

In addition to presenting a general picture, we have also looked for differences between groups of people, based on age⁵, highest completed education⁶, income categories⁷, gender and region⁸.

1.2 Concern for climate change

8 out of 10 respondents in CICERO's climate survey from 2021 are concerned about climate change to some degree. Young people are more concerned about climate change than older age groups, women more than men, Oslo respondents more than those residing in other areas, respondents with low income are more concerned than those with high income, and those with higher education are more concerned than those with less education. Almost half of the respondents believe we are already seeing serious negative consequences in Norway today, and heavy rainfall is considered as the most crucial event. The majority expects their municipality to be negatively affected to some degree by climate change over the next ten years.

Most people are to some degree concerned about climate change

In 2021, only 16% are not concerned about climate change at all, see Figure 1. The largest group of respondents is 'a little concerned'. If we disregard degree of concern (by adding up 'a little', 'quite' and 'very' concerned), we see that 8 out of 10 respondents are to some degree concerned about climate change. The same question was asked in 2018, 2019 and 2020, and the trend is stable over time.

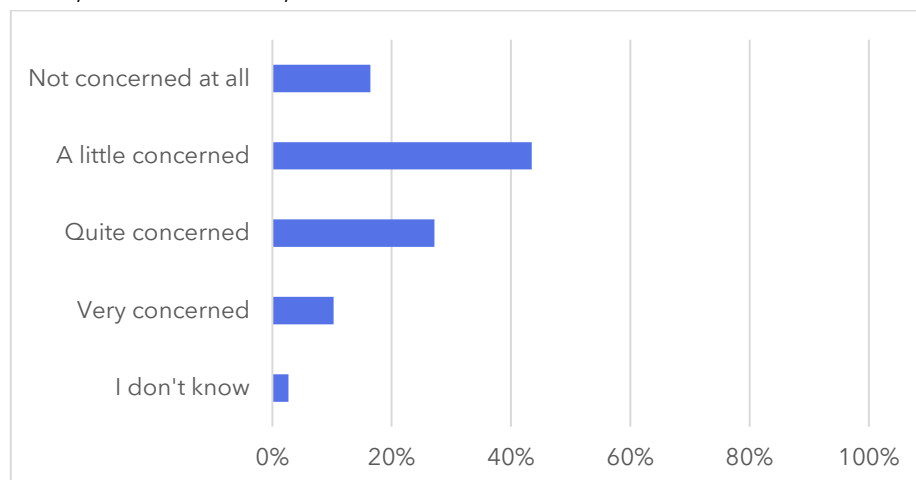


Figure 1: To what extent are you concerned about climate change? Responses in percentages. Year: 2021. N=4873. Source: CICERO's climate survey.

⁴ As the use of formulations about agreement in surveys may entail a tendency for the respondents to support the statement (Hellevik 2020).

⁵ Under 30, 30-59, over 60

⁶ Compulsory school, vocational education, upper secondary school, ≤ 4 years of higher education, and >4 years of higher education. Sometimes these five groups are further aggregated into three groups: Compulsory school, upper secondary school and higher education.

⁷ Personal annual income before tax, in NOK Under 300 000, 300 000-499 999, 500 000-699 999, 700 000-1 000 000, over 1000 000.

⁸ Oslo, east (excluding Oslo), south, west, north and Trøndelag. Sometimes these six groups are further aggregated into four groups: Oslo, east (excluding Oslo), South/west, North/Trøndelag. "Oslo" includes the municipality of Oslo as well as the municipalities that previously made up Akershus.

Young respondents most concerned about climate change

Young respondents report higher climate concern than older age groups (Fig. 2). More than half (53%) of the respondents under 30 years are 'quite' or 'very' concerned, while this is the case for 34% and 45% of the older age groups. 18% of the youngest group are 'very concerned', while this is the case for only 9% and 7% of those between 30-59 or over 60. However, the differences between age groups are much smaller if we include any level of concern ('a little' or more): 87% of respondents under 30 can then be considered concerned, compared to around 80% of the older age groups.

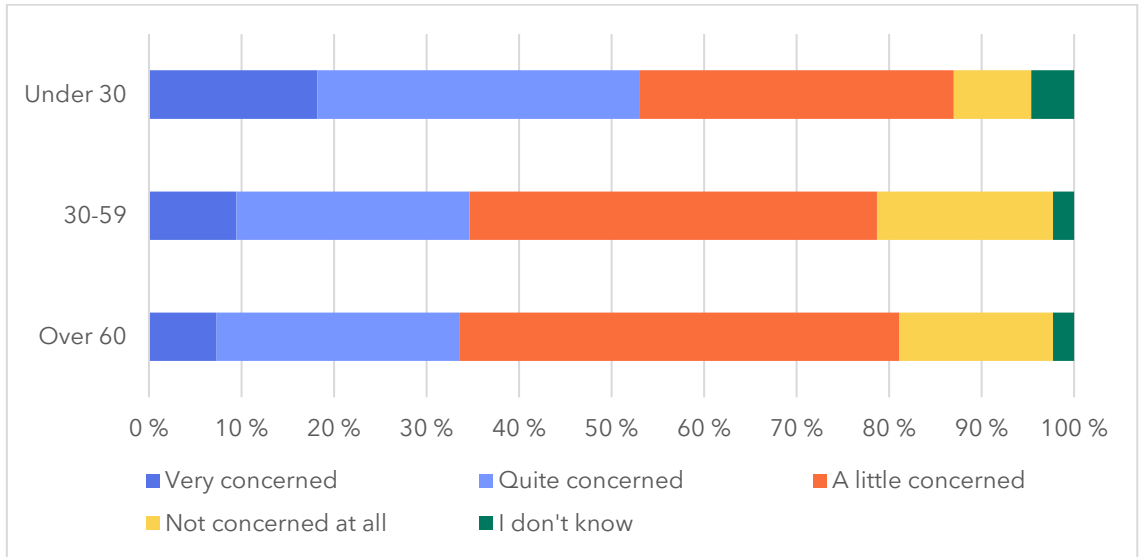


Figure 2: To what extent are you concerned about climate change? Responses per age group, in percentages. Year: 2021. N=4873. Source: CICEROS Climate survey.

Respondents in Oslo and those with lower income are more concerned

Respondents in Oslo are more concerned about climate change than those residing in other areas of Norway, see Figure 3. Almost half (46%) of the Oslo respondents are 'very' or 'quite concerned', whereas the same is the case for less than a third (31%) of those residing in the east (excluding Oslo). The differences decrease if we include all levels of concern.

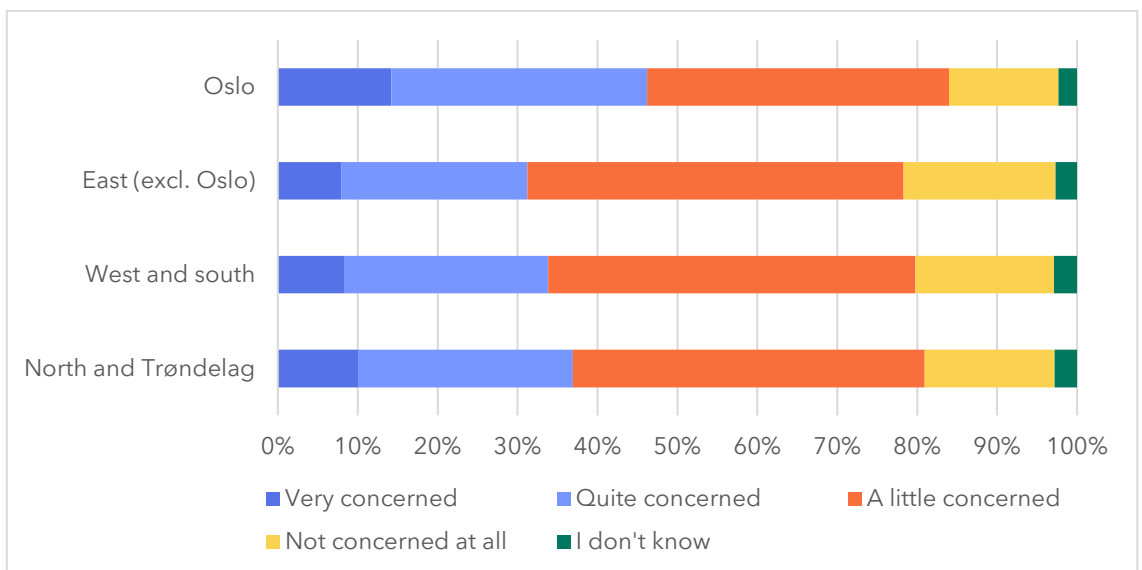


Figure 3: To what extent are you concerned about climate change? Responses per region, in percentages. Year: 2021. N=4873. Source: ACT.

Climate concern also varies across income groups, see Figure 4. Respondents in higher income groups tend to report lower levels of concern. While almost half (47%) of the respondents in the lowest income group are 'quite' or 'very' concerned, this is the case for less than a third (32 and 30%) of the respondents in the two highest income groups. Again, the differences are smaller if we include all levels of concern ('a little' or more).

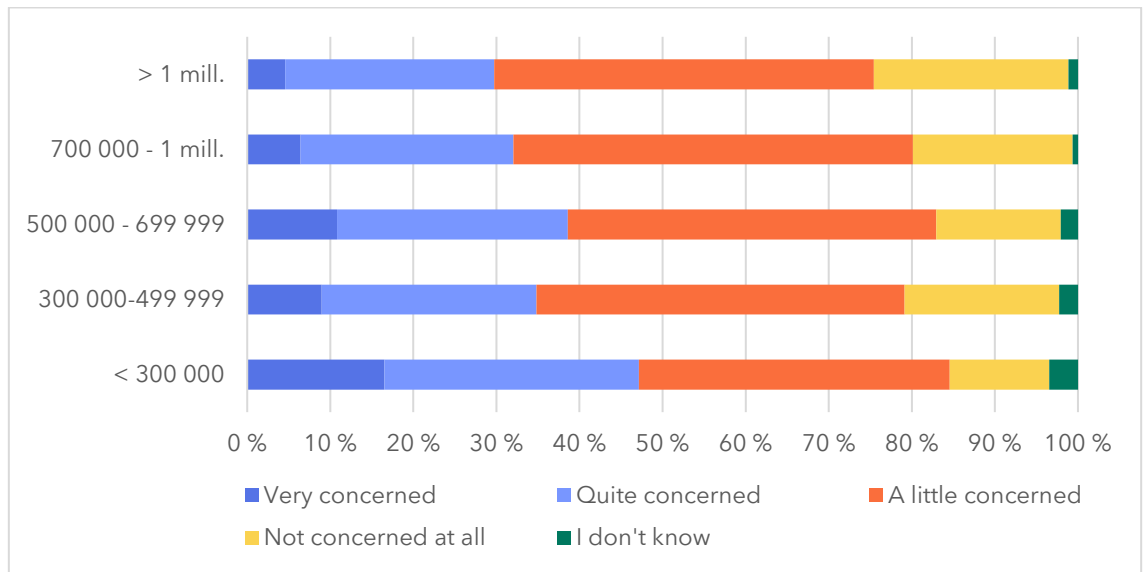


Figure 4: To what extent are you concerned about climate change? Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 609 600 was the average in Norway in 2021. Year: 2021. N=4314. Source: ACT.

Women and people with higher education are more concerned

Female respondents report higher concern about climate change than male respondents (Figure 5). While 44% of the women are 'very' or 'quite' concerned in 2021, this is the case for 31% of the men. If we include all concern levels, the differences are smaller (87% vs. 75%). Nevertheless, almost a quarter (23%) of the men are not concerned at all.

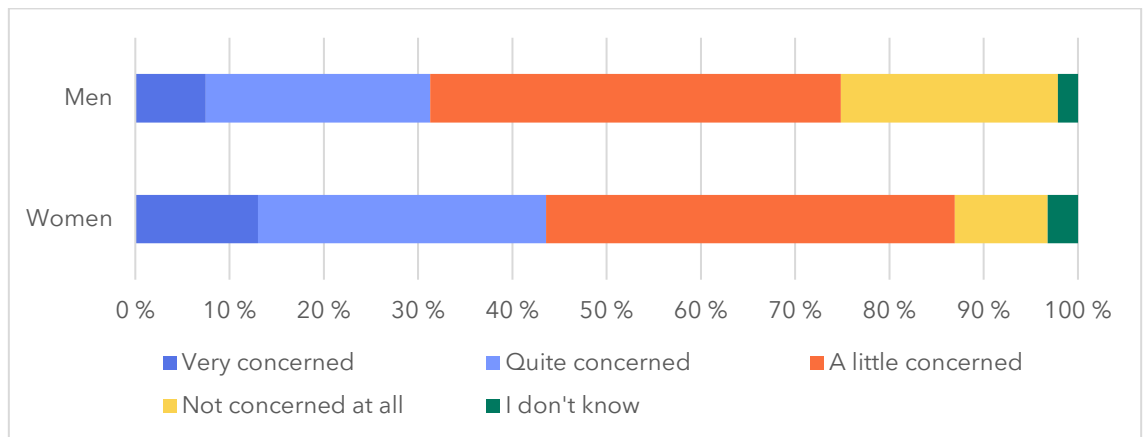


Figure 5: To what extent are you concerned about climate change? Responses per gender, in percentages. Year: 2021. N=4873. Source: : CICEROS Climate survey.

Climate concern also varies across education level, see Figure 6. While more than half (51%) of the respondents with higher postgraduate education are 'very' or 'quite' concerned, this is the case for a quarter (25%) of the respondents with compulsory school or vocational school as their highest completed education. Again, the differences are smaller if we include all levels of concern (88% vs 74%).

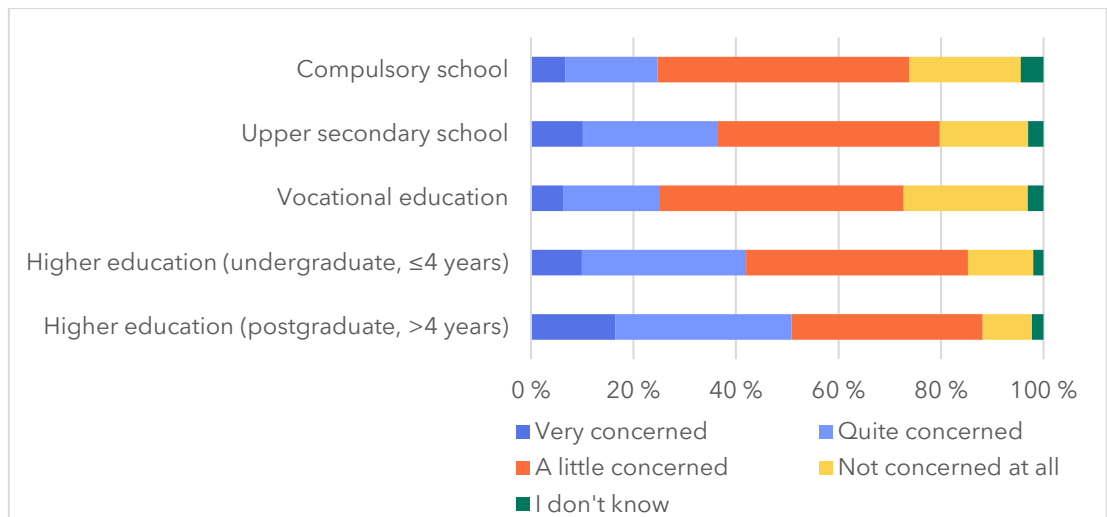


Figure 6: To what extent are you concerned about climate change? Responses per education group (highest completed), in percentages. Year: 2021. N=4873. Source: : CICEROS Climate survey

We have also performed ordered logistic regression analysis, see Table 2 in the Appendix. The main statistical findings described above are confirmed: Respondents under 30 years of age are more concerned about climate change than the other age groups. The respondents in the lowest income group (with annual income before tax under NOK 300 000), are also more concerned than other income groups, and there is a tendency for higher income groups to be less worried. Women and people with higher education are also more concerned about climate change than men and those with less education. And finally, respondents residing in Oslo are more concerned than respondents in other regions. The differences between the regions decrease when we include the centrality index⁹ of Statistics Norway (column 4 in Table 2), illustrating that parts of the captured differences between regions in column 3 are due to differences between urban and rural areas, and not only to differences between the regions.

4 out of 10 have personal experience from climate change

In 2021 almost 4 out of 10 respondents in CICEROs climate survey report that they have personally experienced that climate change is happening ('matches quite well' or 'very well'), see Figure 7. These figures are quite stable over recent years. However, a large share of the respondents are uncertain or ambivalent: 32% answers 'matches neither well nor poorly' and 11% answers 'I don't know' in 2021. Only 2 out of 10 disagrees ('matches quite poorly' or 'very poorly').

⁹ The centrality index from Statistics Norway, which measures proximity to goods and services, is available at: <https://www.ssb.no/befolkning/artikler-og-publikasjoner/sentralitetsindeksen.oppdatering-med-2020-municipalities>.

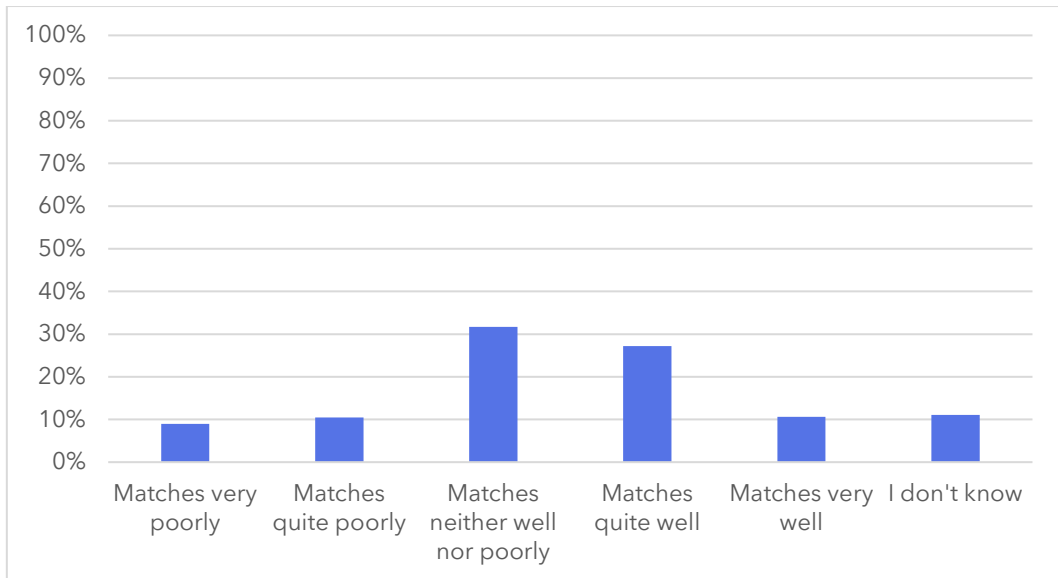


Figure 7: I have personally experienced that climate change is happening. Responses in percentages. Year: 2021. N=4879. Source: CICEROS Climate survey.

Slight differences in experiences between age groups, regions and income groups

Personal experience with climate change differs somewhat across age groups, see Figure 8. While 44% of respondents under 30 report that they have personally experienced that climate change is happening ('matches quite' or 'very well'), the same is the case for 36-37% of the two older age groups. Events may be interpreted differently, depending on the respondents' perception of climate change in general. We already know from the ACT-survey that young people tend to have climate attitudes that are more in line with science, be more concerned about climate change, willing to make changes in their own behaviour and support climate policies than older age groups (Aasen, Klemetsen and Vatn, 2022). The differences between age groups may thus be related to how the events are interpreted, rather than differences in actual experiences.

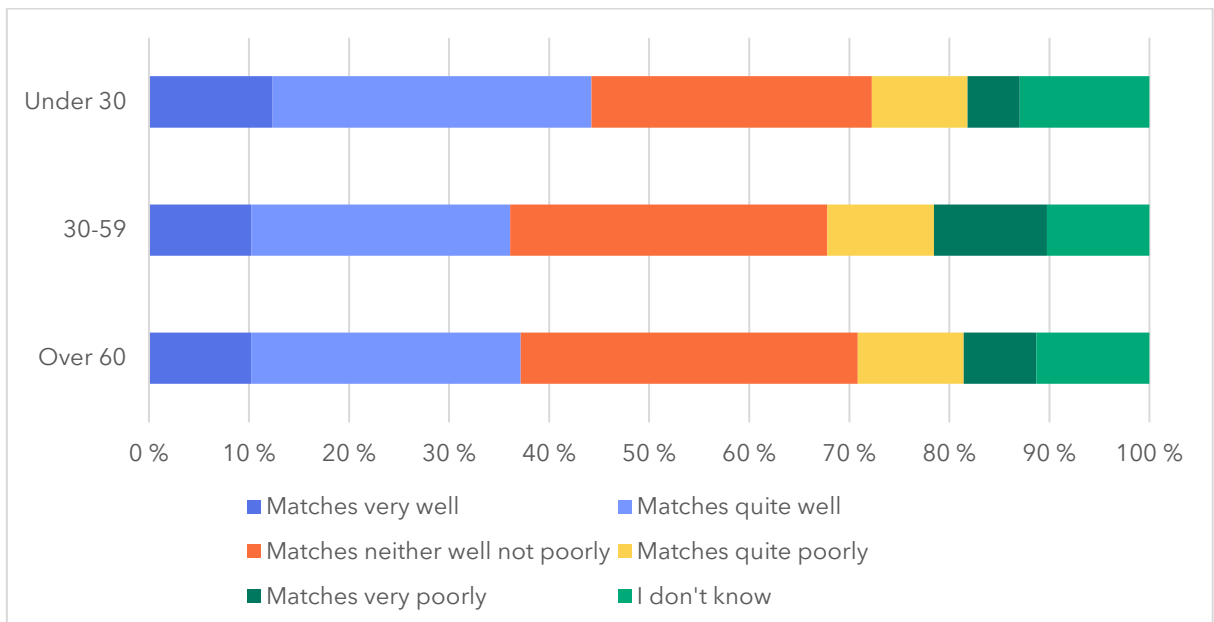


Figure 8: I have personally experienced that climate change is happening. Responses per age group, in percentages. Year: 2021. N=4879. Source: : CICEROS Climate survey.

There are some slight differences between the regions, see Figure 9. While 45% of the respondents residing in Oslo report in 2021 that they have experienced climate change personally ('matches very well' or 'quite well'), only 33% of respondents in the rest of the east region do. A possible explanation is that more urban areas are more exposed to surface water as densely populated areas typically involve dense housing, paved surfaces, etc. (Alnes et al. 2018). However, another possible explanation is that attitudes towards climate change also tend to differ slightly between the regions, and in particular between urban and rural areas (Aasen, Klemetsen, and Vatn 2022). E.g., in 2021, 77% of the Oslo respondents disagree that human activity does not affect the climate, whereas the same is the case for 68% of the respondents residing in the rest of the east region (figure not included). The regional differences may thus be related to how the events are interpreted, rather than actual geographic differences.

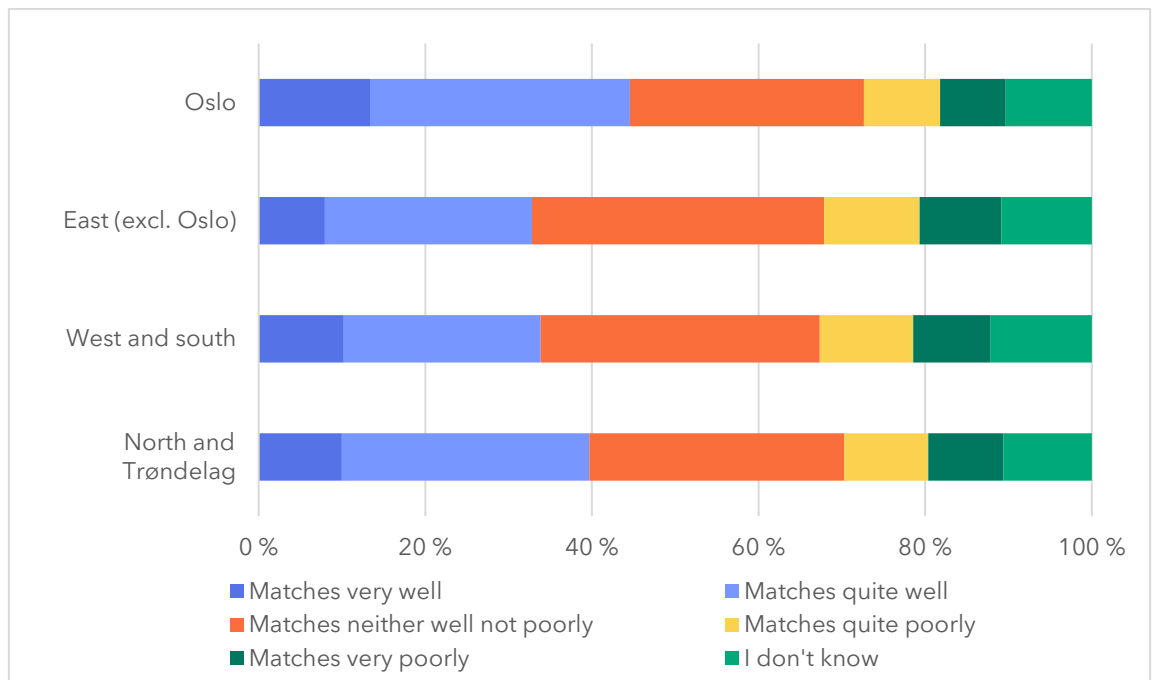


Figure 9: I have personally experienced that climate change is happening. Responses per region, in percentages. Year: 2021. N=4879. Source: CICEROS Climate survey.

Respondents with higher income report having personal experiences with climate change to a slightly lower degree than respondents in the lowest income group, see figure 10. While 43% of those with annual income before tax less than NOK 300 000 report having personally experienced this, 34% of those with at least NOK 1 million do. A possible explanation is that higher income groups may tend to live in less exposed areas. But again, climate attitudes in general may account for parts of the differences, as the highest income group tends to be less concerned about climate change, less willing to change their own behaviour and less willing to support policies than the lower income groups (Aasen, Klemetsen and Vatn, 2022).

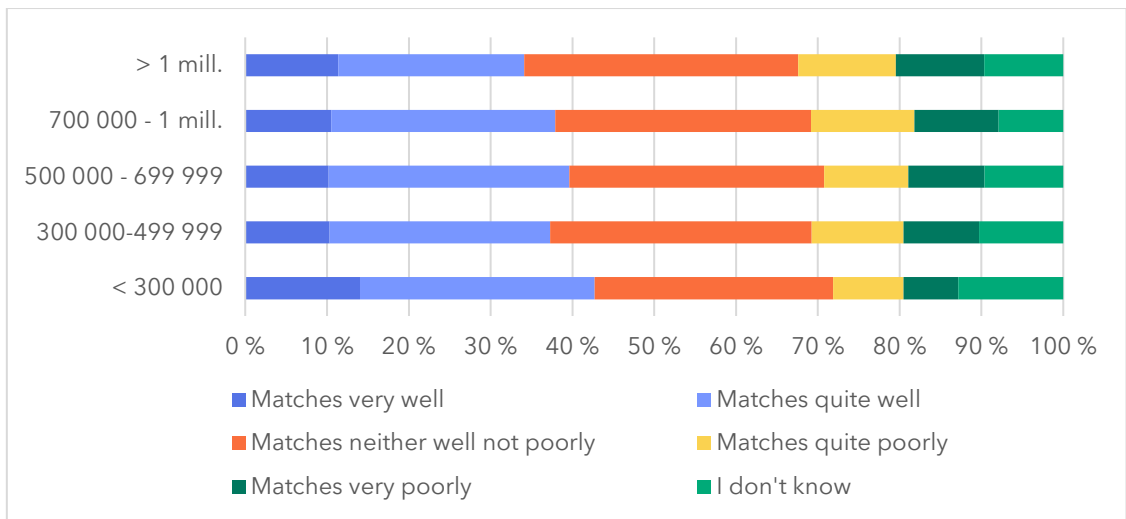


Figure 10: I have personally experienced that climate change is happening. Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 609 600 was the average in Norway in 2021. Year: 2021. N=4879. Source: ACT.

Rain considered most crucial event

Figure 11 shows that most of the respondents from the Norwegian Citizen Panel in 2021 expect 'periods with a lot of rain' to be the most significant climate change related event in their municipality over the next ten years. This is in line with the scientific predictions for Norway, predicting more frequent and heavy rainfall as one of the most likely consequences (Aamaas et al. 2018). Annual figures from Finance Norway show an increasing trend in payments related to flooding from both private insurance companies and the Norwegian Natural Perils Pool (Alnes et al. 2018).

12% of the respondents answer that they do not think that climate change will matter. This share appears quite high compared to other surveys: In CICEROs climate survey, less than 4% of respondents in 2021 reported that the climate is not changing. A possible explanation is that the question in this survey relates to the consequences in the respondents' own municipality, rather than global climate change. Some studies suggest that the vulnerability to climate change per se (direct, physical consequences) is relatively low in Norway. On the other hand, climate change in other countries could have serious impacts on Norway as a small, open economy (indirect, transborder risks).

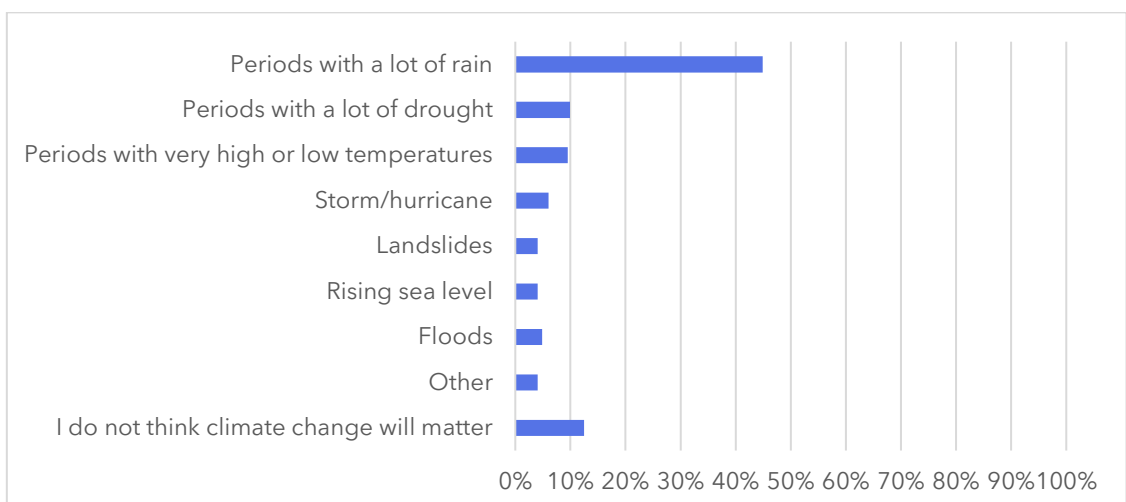


Figure 11: Which of the following events do you think will have the greatest significance in your municipality in the next 10 years? (Select one alternative.) Responses in percentages. Year: 2021. N = 1940. Source: Norwegian Citizen Panel.

Almost half believe serious consequences are already evident

Figure 12 shows when the respondents from the Norwegian Citizen Panel in 2021 believe Norway will experience serious negative consequences of climate change. The largest group - 47% the respondents - think we are already witnessing the consequences, whereas a quarter of the respondents believe the consequences will be visible during the next decade. 6% of the respondents believe that we will never experience serious negative consequences of climate change.

Hanssen-Bauer et al. (2015) describe detailed projections of climate change in Norway up to the middle and end of this century. For shorter time perspectives, such as 10 - 20 years ahead, the authors point out that the natural variations will largely dominate the increased greenhouse effect. However, they show that temperatures and rainfall in Norway have already increased since 1971-2000 (ibid., p. 89-90).

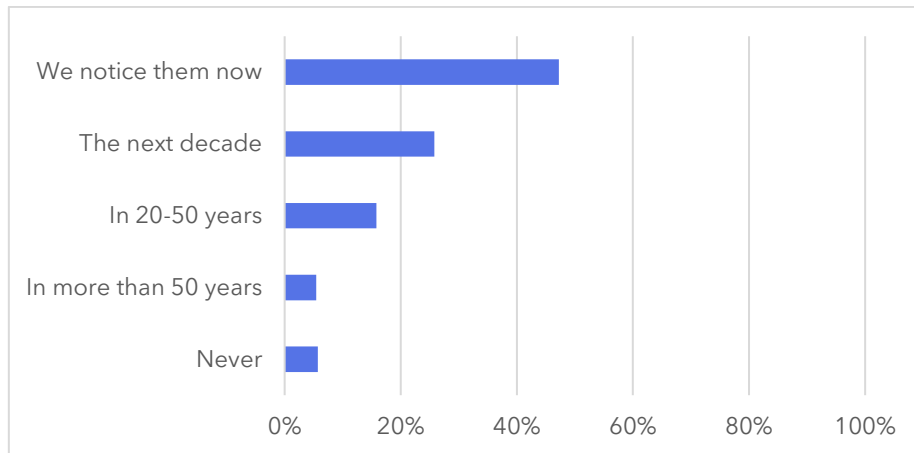


Figure 12: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses in percentages. Year: 2021. N = 1930. Source: Norwegian Citizen Panel.

The age groups have quite similar views on the timing of climate change consequences, see Figure 13. While almost half (48%) of the respondents under 30 believe we are already noticing serious negative consequences of climate change, this is the case for 47% of those between 30-59, and 44% of those over 60. The differences decrease further if we look at relevant responses combined (e.g., 'the next decade' or earlier).

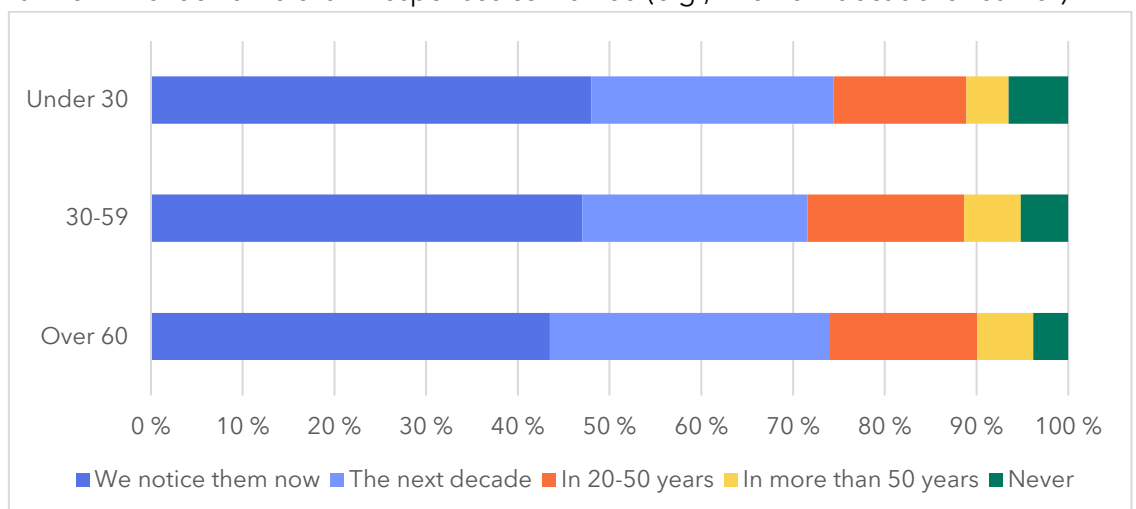


Figure 13: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses per age group, in percentages. Year: 2021. N = 1930. Source: Norwegian Citizen Panel.

Most Oslo respondents believe we already observe serious consequences

The differences are more notable when comparing regions, see Figure 14. While 55% of the respondents residing in Oslo believe we are already seeing serious negative consequences, 41% of the respondents in Trøndelag believe the same. Only 2% of the respondents in Oslo believe we will never experience these consequences, while these shares are higher in other areas (e.g., 7% in the west).

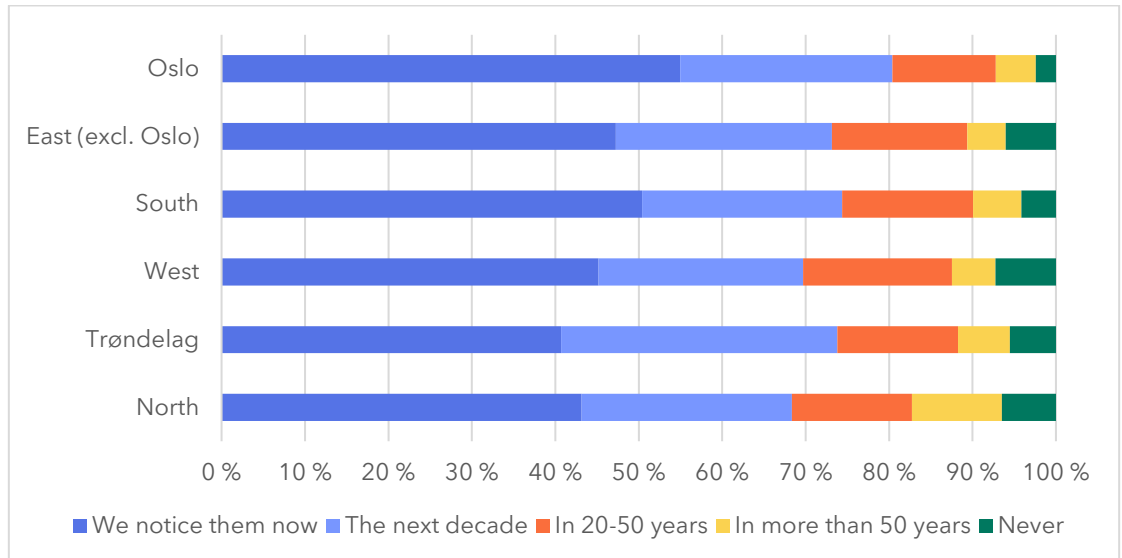


Figure 14: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses per region, in percentages. Year: 2021. N = 1930. Source: Norwegian Citizen Panel.

Figure 15 displays the differences between income groups. We see that the highest share of respondents who are not convinced that we are already noticing serious negative consequences, is the highest income group. However, the views otherwise vary between income groups in a non-linear way.

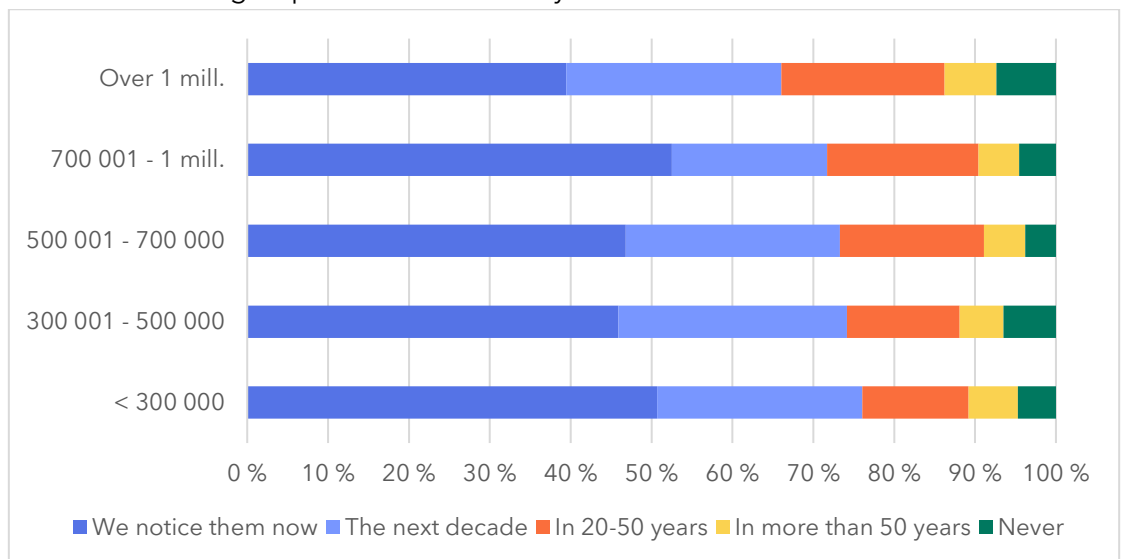


Figure 15: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 587 600 was the average in Norway in 2020. Year: 2021. N = 1930. Source: Norwegian Citizen Panel.

More women than men believe we already observe serious consequences

There are clear differences between male and female respondents of the Norwegian Citizen Panel in their views on when the serious negative consequences will be or are

evident, see Figure 16. While 56% of the female respondents report that the consequences are already noticeable, this is the case for 39% of the male respondents. Moreover, while only 3% of the female respondents believe that we will never experience serious negative consequences, 8% of the male ones do. More men also believe Norway will experience these consequences in more than 50 years.

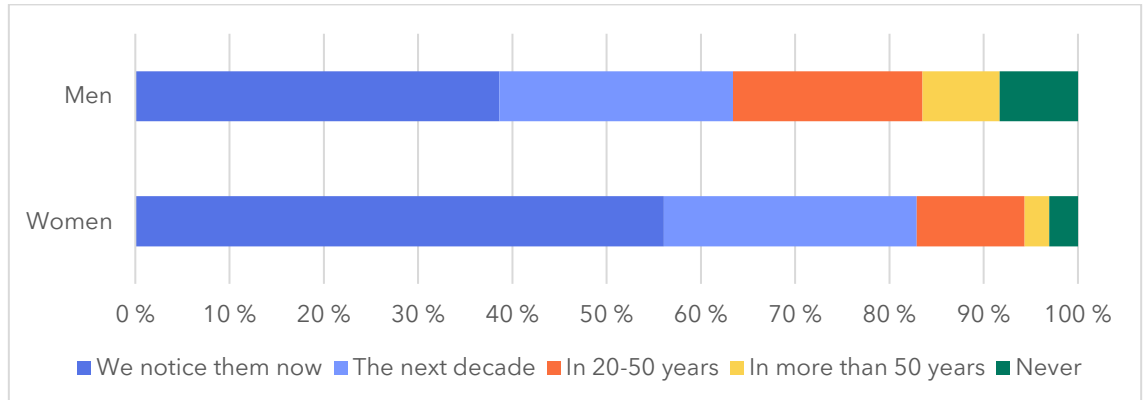


Figure 16: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses per gender, in percentages. Year: 2021. N = 1551. Source: Norwegian Citizen Panel.

Most respondents with higher education believe we are already observing serious consequences

Figure 17 shows clear differences between respondents based on their highest completed education. The majority of the respondents with higher education (52%) believe we are already seeing these consequences, while this is the case for 34% and 38% of those with compulsory school or upper secondary school, respectively. Among the respondents with compulsory school as their highest completed education, as much as 16% believe we will never see serious negative consequences of climate change in Norway. The same holds for only 4% of the respondents with higher education.

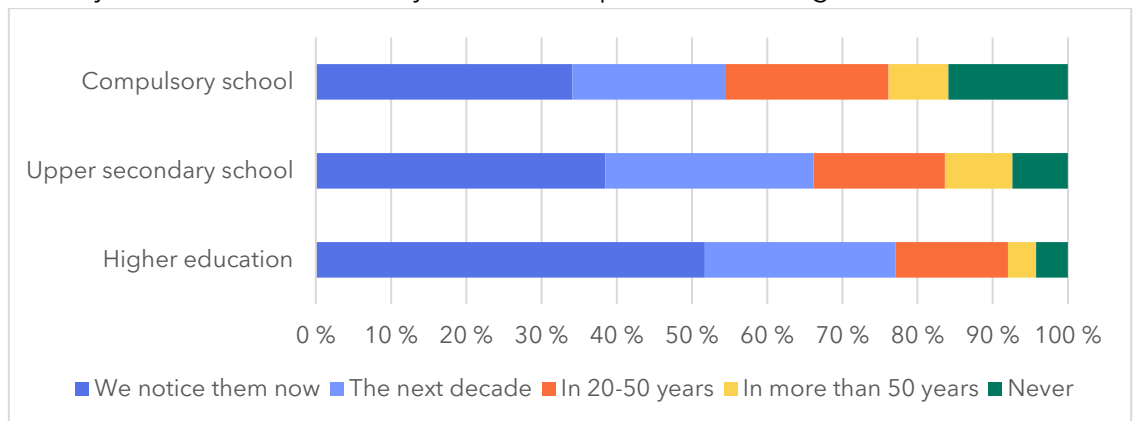


Figure 17: When do you think that Norway will experience serious negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges)? Responses per education group (highest completed), in percentages. Year: 2021. N = 1897. Source: Norwegian Citizen Panel.

Expecting their municipalities to be affected by climate change

A clear majority of the respondents (58%) to some degree expects their municipality to be negatively affected by climate change over the next ten years, see Figure 18. If we only include the respondents that 'strongly agree' or 'agree', only a third of the respondents can be said to expect their municipality to be affected. Almost 1 out of 5 of

the respondents disagree (or 1 out of 10 if we only include those who 'strongly disagree' or disagree'), and as much as a quarter is ambivalent.

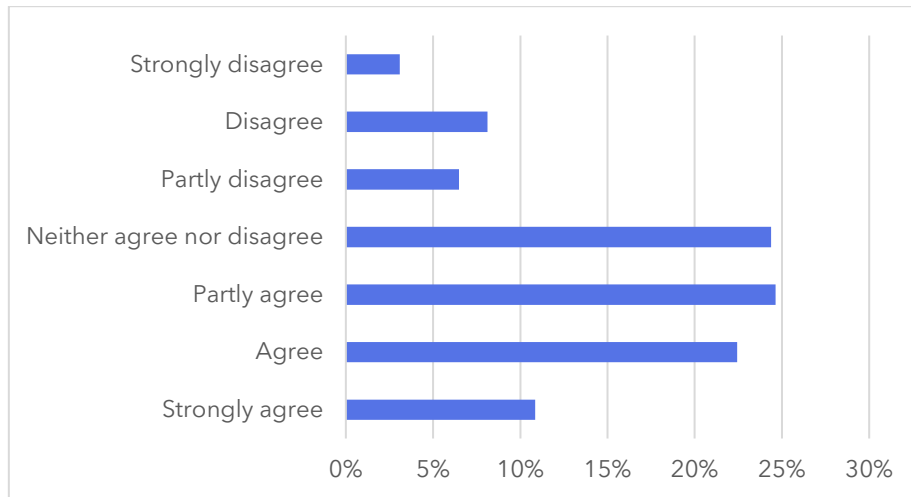


Figure 18: My municipality will be negatively affected by climate change over the next 10 years. Responses in percentages. Year: 2021. N = 1944. Source: Norwegian Citizen Panel.

1.3 Concerns for property damage

The November 2022 round of data collected from the Norwegian Citizen Panel includes questions about property ownership, concerns about property damage from extreme weather events and climate change and measures to reduce the risk of damage.

Respondents were asked whether they worry that extreme weather events or consequences of climate change will cause damage to their home. As shown in Figure 19, a relatively large share of the respondents (42%) report that they are not at all worried about this type of damage to their home. The largest share of respondents (45%) report to be somewhat worried, which is in line with the question about concern for climate change in general (Figure 1).

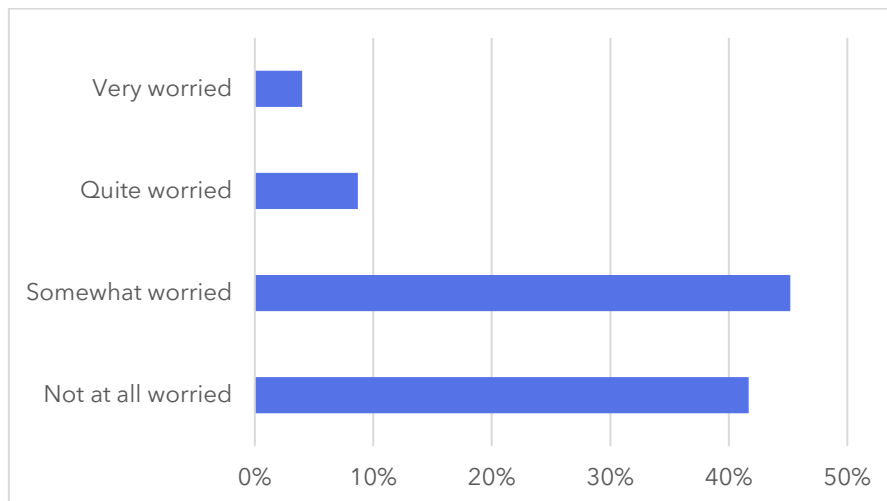


Figure 19: Are you worried that extreme weather events or consequences of climate change will cause damage to your home? Weighted shares.¹⁰ Year: 2022. N = 2042. Source: Norwegian Citizen Panel.

Figure 20 shows that the share of respondents reporting to be quite worried or very worried about damage to their home is highest in Trøndelag, followed by northern Norway and Oslo. As previously discussed, this may be interpreted as reflecting

¹⁰ Numbers are weighted based on age, gender, region and education to improve representativeness.

exposure to risk of damage, but it may also reflect differences in how exposure and risk of damage is interpreted, rather than actual geographic differences. A clear majority of respondents in all regions report that they are either somewhat worried or not at all worried about damage from extreme weather events or consequences of climate change.

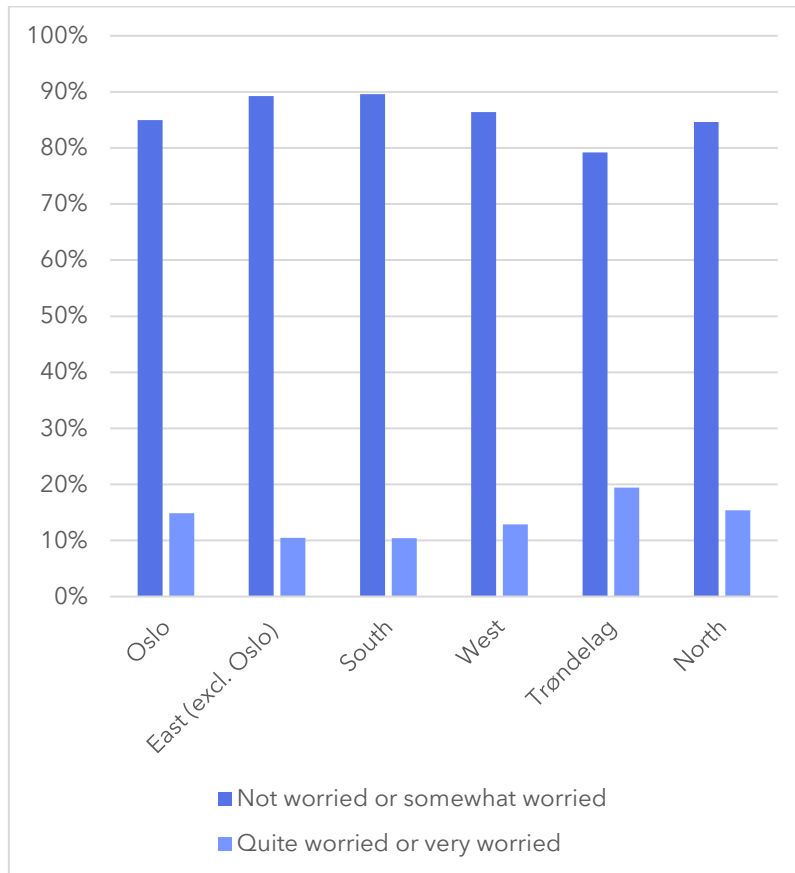


Figure 20: Are you worried that extreme weather events or consequences of climate change will cause damage to your home? Weighted shares by region. Year: 2022. N = 2042. Source: Norwegian Citizen Panel.

Risk of exposure may also be related to type of housing. Figure 21 shows that half of all respondents living in apartment buildings report that they are not at all worried about damage from extreme weather events or consequences of climate change to their homes. This share is significantly higher than among those that live in single family homes (40%) or semi-detached houses, terraced houses or similar (35%). This may be because both risk and responsibility for damage prevention is shared with other owners in apartment buildings, but also that a larger share of those that live in apartment buildings are renters, and therefore do not bear the risk of damage. For the other two housing categories, the majority of respondents report that they are somewhat worried about this type of damage.

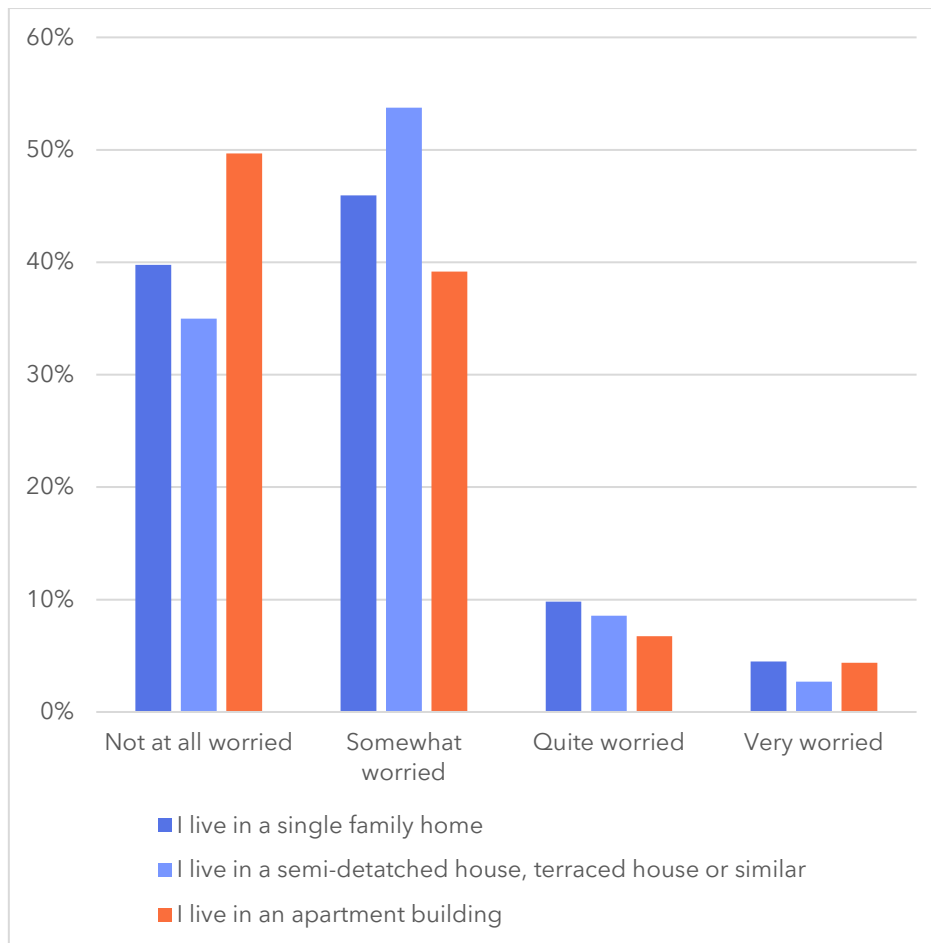


Figure 21: Are you worried that extreme weather events or consequences of climate change will cause damage to your home? Weighted shares by type of housing. Year: 2022. N = 2042. Source: Norwegian Citizen Panel.

1.4 Who are responsible for adaptation measures?

9 out of 10 respondents in Norwegian Citizen panel from 2020 view the central government as responsible, whereas only 5 out of 10 regard the municipalities as responsible, and 4 out of 10 view private businesses and households as responsible. Many respondents thus underestimate the responsibilities of municipalities, private businesses and households. 8 out of 10 respondents acknowledge that they can take measures to protect themselves against the consequences of climate change. Compared to younger age groups, those over 60 tend to pick fewer other responsible actors than the central government. Nevertheless, they are at least equally willing to take own measures to protect their own household as their younger counterparts. Women, high income groups, and respondents in the south more often agree that they can take measures.

Municipalities have a main responsibility

Several actors in Norway have responsibilities in securing preparedness against the consequences of climate change. The responsibility for climate adaptation lies with the actor who is responsible for a task or function that is affected by climate change (Norwegian Environment Agency 2022). This means that has all societal actors have a responsibility for climate change adaptation: households, private businesses, and authorities (*ibid.*). Interest groups and voluntary organizations also have important roles to play in the work of climate adaptation (*ibid.*).

As the principal spatial planners, local governments are strategically positioned to deliver climate change adaptation strategies devised from above and in coordinating bottom-up action (Dannevig and Aall 2015). The municipalities are responsible for planning and preparedness. They are required by law to carry out risk and vulnerability assessments through the Civil Protection Act (2010). Consequences of climate change are examples of events that must be considered (Ministry of Climate and Environment 2013). Climate change must also be incorporated into the municipalities' work with other security and preparedness issues (*ibid.*). However, climate risks often transgress municipality borders. According to the central government planning guidelines (Ministry of Local Government and Regional Development 2018), the county administration and country governors also have responsibilities in this regard. The county administrations should initiate cooperation and learning about climate adaptation across municipal and regional boundaries. The municipality must be restrictive of development in risk-prone areas and ensure that new constructions are adapted to a changing climate (Selseng, Klemetsen, and Rusdal 2021). They must ensure that private developers and builders comply with the functional requirements in the Planning and Building Act and the building regulations (TEK17 2022).

The central government and its national bodies are responsible for obtaining, systematizing and facilitating knowledge about the consequences of climate change and measures for adaptation in their areas, with assistance from among others the county municipality and the county governor (Ministry of Local Government and Regional Development 2018; Norwegian Environment Agency 2022). Among other things, county-specific climate profiles¹¹ for all counties in Norway are available.

Private households and businesses also have responsibilities

Private households and businesses also have responsibilities in terms of damage prevention and limitation, maintenance, and supervision. Norway has a combined public and private solution to cover losses after natural disasters (Ministry of Agriculture and Food 2022). An ordinary homeowners' insurance covers flood damage because the Natural Damage Insurance Act requires this (Ministry of Justice and Public Security 1990). Property insured against fire damage in a private insurance company are automatically insured against natural damage through the Norwegian Natural Perils Pool.¹² If an insured property is damaged by a natural disaster, the owner can claim compensation from the insurance company (Ministry of Agriculture and Food 2022). For damages to assets that cannot be insured (e.g., facilities for industry, sports and tourism, private roads and bridges and agricultural land), the owner can apply for compensation from the 'public natural damage scheme (*ibid.*).

However, there are significant limitations to these compensation schemes: The natural damage scheme and the natural perils pool only provide compensation for natural damage, i.e., damage that directly, suddenly and in an unforeseen way is caused by storms, storm surges, floods, landslides, etc. Importantly, the natural perils pool thus does not cover damage from extreme precipitation, which accounts for most weather-related damage claims. Moreover, property owners have a duty to prevent or limit the extent of the damage. If the damage is wholly or partly due to poor construction or poor

¹¹ <https://klimaservicesenter.no/kss/klimaprofiler/om>

¹² In 1980 a general natural damage insurance in Norway was introduced, as a mandatory part of the fire insurance, see <https://www.naturskade.no/hva-er-norsk-naturskadepool/>

maintenance and supervision, the natural damage compensation from both the insurance company and the government can be reduced or waived.

Confusion about responsibilities

In the Norwegian Citizen Panel, the respondents were asked who they regarded as responsible for securing us against the future consequences of climate change. 9 out of 10 respondents in the survey view the central government as responsible, whereas only 5 out of 10 points to the municipalities (Fig. 22). Around 4 out of 10 view private businesses and households as responsible. The respondents could pick more than one responsible actor, and most do. However, 3 out of 10 pick the central government as the sole responsible party.

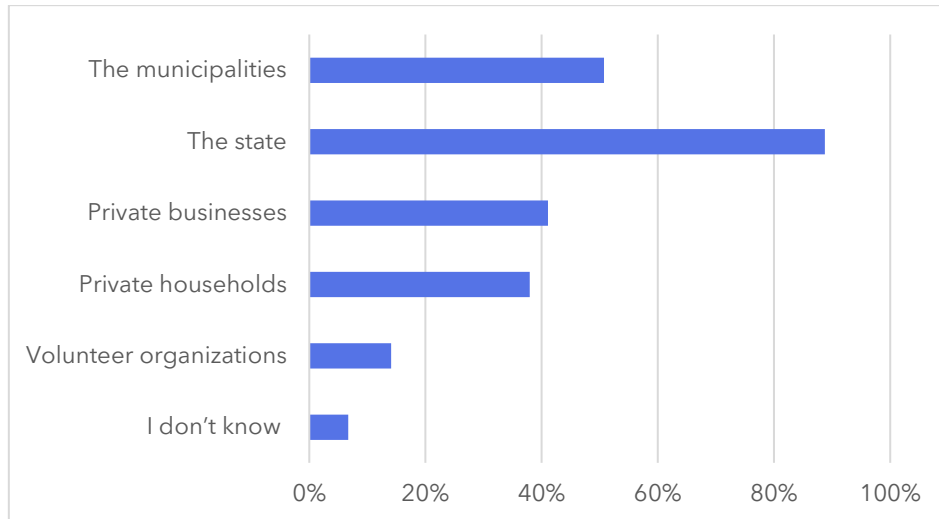


Figure 22: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses in percentages. Year: 2020. N = 1980. Source: Norwegian Citizen Panel.

Much of the formal responsibility and focus on climate adaptation lies with the municipalities. It is therefore somewhat striking that only half of the respondents think that the municipalities have a responsibility. On the other hand, there is generally little focus on the private business sector and especially on the private household's responsibility for climate adaptation (Skogvang and Holm 2022).

A possible explanation for the low share of respondents assigning a responsibility to the municipalities, private businesses and households is that knowledge on actual division of responsibility is lacking or low. In a study of local and regional barriers for climate adaptation, Vindegg et al. (2022) identify lack of clarity in the division of responsibility on the climate adaptation area. Our findings indicate that a lack of clarity appears to apply to the division of responsibilities on the climate adaptation area towards private businesses and households as well.

Another possibility is that some of the respondents interpret the question as normative, believing it is natural that the central government should take more responsibility than today. This may be part of the explanation, as there have been discussions about whether the central government should take more responsibility – e.g., in terms of vertical and horizontal coordination, providing more guidelines and requirements to municipalities (such as e.g., more targeted and local knowledge than the existing county climate profiles, or requirements to private developers), more funding and incentives for preventive efforts, etc. (If 2020; Klemetsen and Dahl 2020; Vindegg et al. 2022).

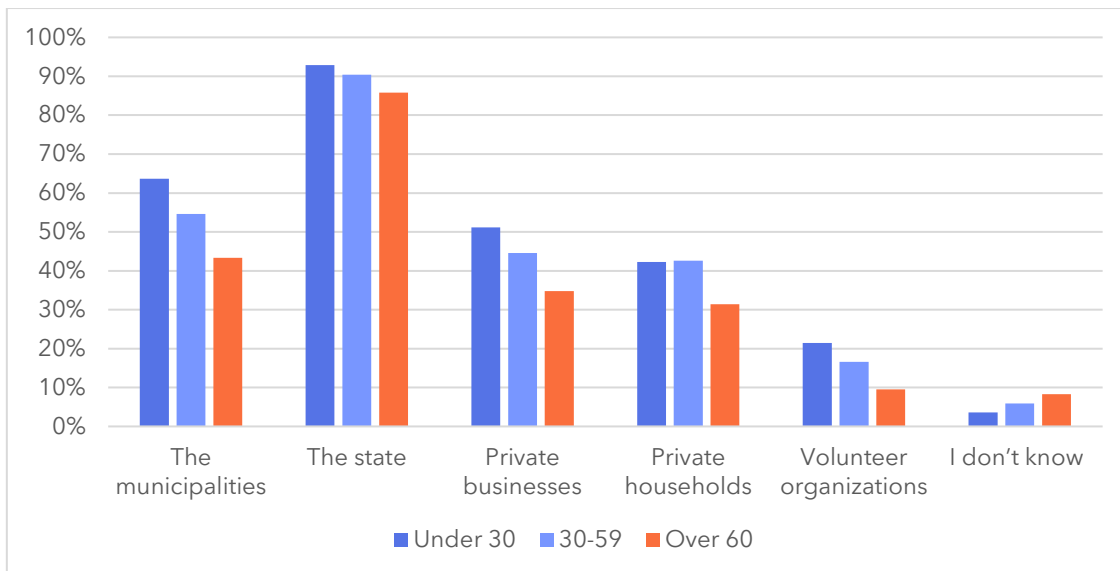


Figure 23: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses per age group, in percentages. Year: 2020. N = 1980. Source: Norwegian Citizen Panel.

The division of responsibilities particularly underestimated by respondents over 60

The central government is regarded as a responsible party by a vast majority of respondents within all age groups, see Figure 23. Furthermore, the different actors are ranged in the same order in all age groups (although note that the respondents are not asked to range them): the central government, municipalities, private businesses, private households, volunteer organizations. However, there are still some notable differences between the age groups: In the 'under 30'-group, a clear majority (64%) view the municipalities as a responsible party, whereas among the 'over 60'-group, less than half (43%) do. Moreover, only 31% of the oldest age group view private households as responsible, whereas 42-43% of the two younger age groups do. Private businesses are viewed as responsible by 35% of the respondents over 60, whereas 51% and 45% of the 'under 30' and the '30-59' age groups believe this. In the 'under 30' group, 21% also place responsibility with volunteer organizations, whereas 17% of the '30-59'-group and 10% of those over 60 do.

As mentioned above, the respondents could pick more than one alternative. The 'over 60' age group tend to pick fewer alternatives than those who are younger, and to a lesser extent attribute other than the central government responsibility for climate adaptation. Moreover, they are more often uncertain about the division of responsibility (they answer 'I don't know').

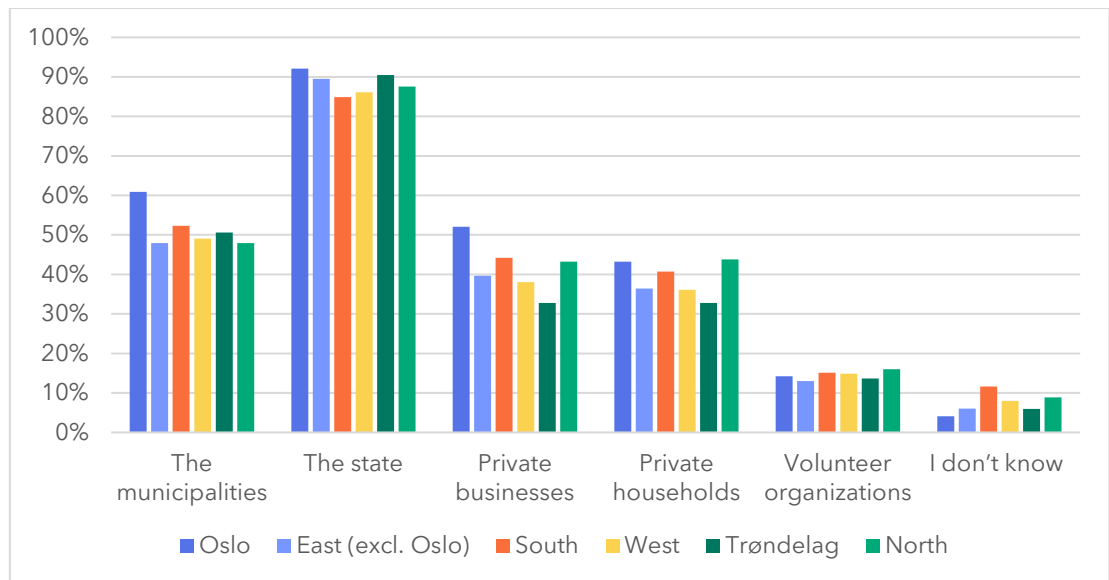


Figure 24: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses per region, in percentages. Year: 2020. N = 1980. Source: Norwegian Citizen Panel.

The differences between the regions appear to be a somewhat smaller than those between the age groups. The vast majority across all regions view the central government as responsible, see Figure 24. Among the respondents in Oslo, as many as 61% view the municipalities as responsible, while around half of the respondents in other regions do. More than half of the respondents in Oslo also tend to place responsibility on private businesses, whereas e.g., only a third of the respondents in Trøndelag do. The differences regarding the perceived responsibility of private households are smaller, but over 40% of the respondents in the north, Oslo and south of Norway report this to be the case, compared to a third of the respondents in Trøndelag. Few respondents in any region perceive volunteer organizations to be responsible for securing us against the consequences of climate change. The largest group of uncertain respondents resides in the south, whereas the Oslo citizens are the least uncertain.

The perceived responsibility of households increases with income

A vast majority in all income groups perceive the central government as responsible for securing preparedness against climate change, see figure 25. Respondents with a personal annual income before tax between NOK 700 000 - 1 million tend to more often than other groups also view the municipalities as responsible (63%, compared to around half in the other income groups). Higher income groups perceive private households as responsible as well (49% of those in the high end of the income scale vs. 31% of those in the lower end). A slightly larger share of higher income groups also views private businesses as responsible. Across all income groups, few perceive volunteer organizations as responsible. The uncertainty about who is responsible is somewhat larger among the low-income groups.

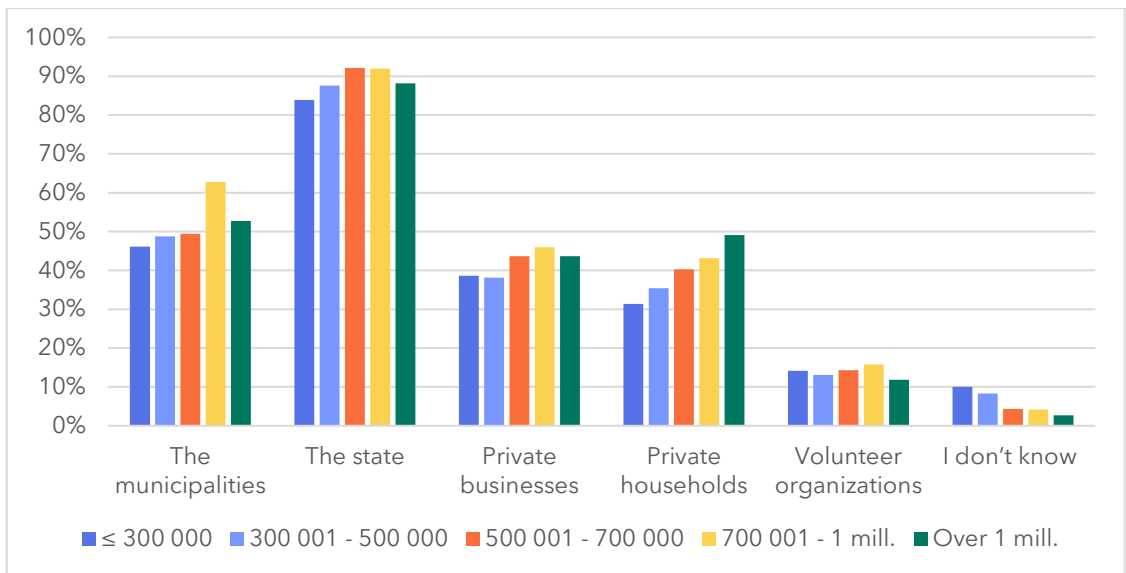


Figure 25: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 569 900 was the average in Norway in 2019. Year: 2020. N = 1941. Source: Norwegian Citizen Panel.

Women slightly more inclined to view other actors as responsible

A vast majority of both male and female respondents perceive the central government to be responsible for the preparedness against climate change, and about half of also view the municipalities as responsible, see Figure 26. Women more often answer that private businesses (45 vs. 37%) and households (43 vs. 33%) as responsible as well, compared to men.

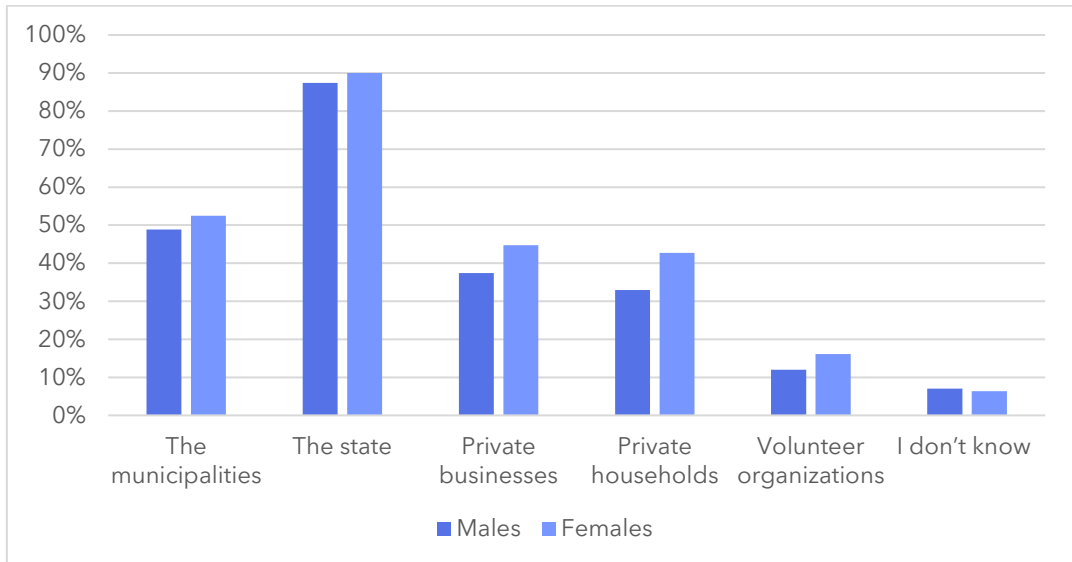


Figure 26: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses across gender, in percentages. Year: 2020. N = 1980. Source: Norwegian Citizen Panel.

Respondents with higher education more aware of the shared responsibilities

There are also some differences in views between respondents based on their education levels, see Figure 27. Whereas a vast majority across all education levels view the central government as responsible, a slightly higher share of those with higher education do.

The respondents with higher education more often perceive municipalities, private businesses, and private households as responsible as well.

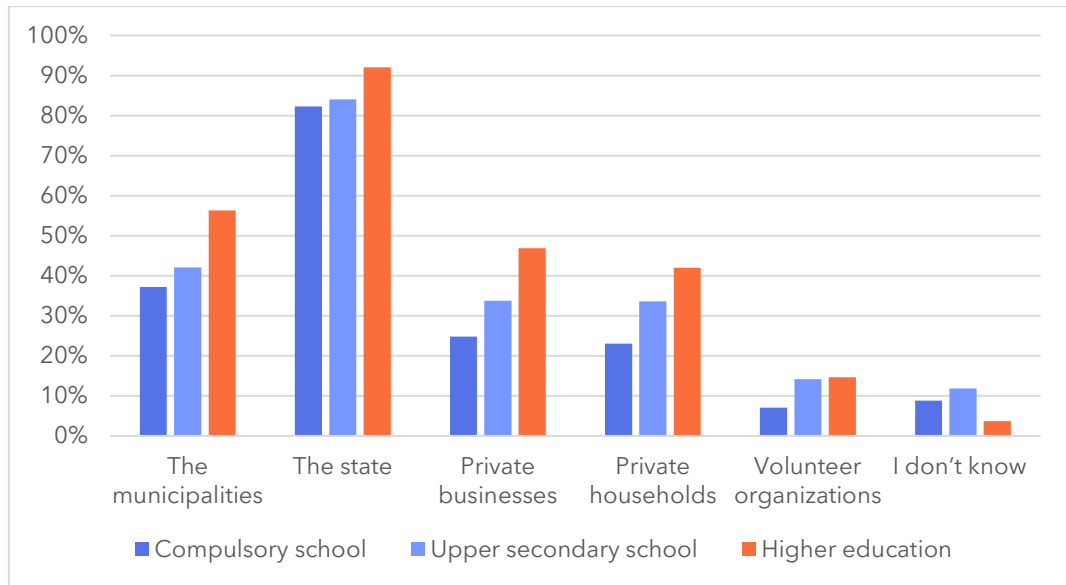


Figure 27: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses per education group (highest completed), in percentages. Year: 2020. N = 1924. Source: Norwegian Citizen Panel.

Understanding of responsibility is related to ability to take own measures

As Figure 28 shows, those who are able to take own measures (i.e., agree at least ‘partly’ that they can take measures to help protect their property), tend to more often believe that private households indeed have a responsibility (42 vs. 21% among the less willing). However, it is not necessarily the case that those who are less able to take own measures believe that the responsibility lies elsewhere: In fact, a lower share of this group attributes responsibilities to other actors - municipalities, the central government, private businesses, and volunteer organizations - as well. Moreover, a larger share of those less willing to take measures themselves are uncertain about where the responsibility lies (15% vs. 4% among those more able).

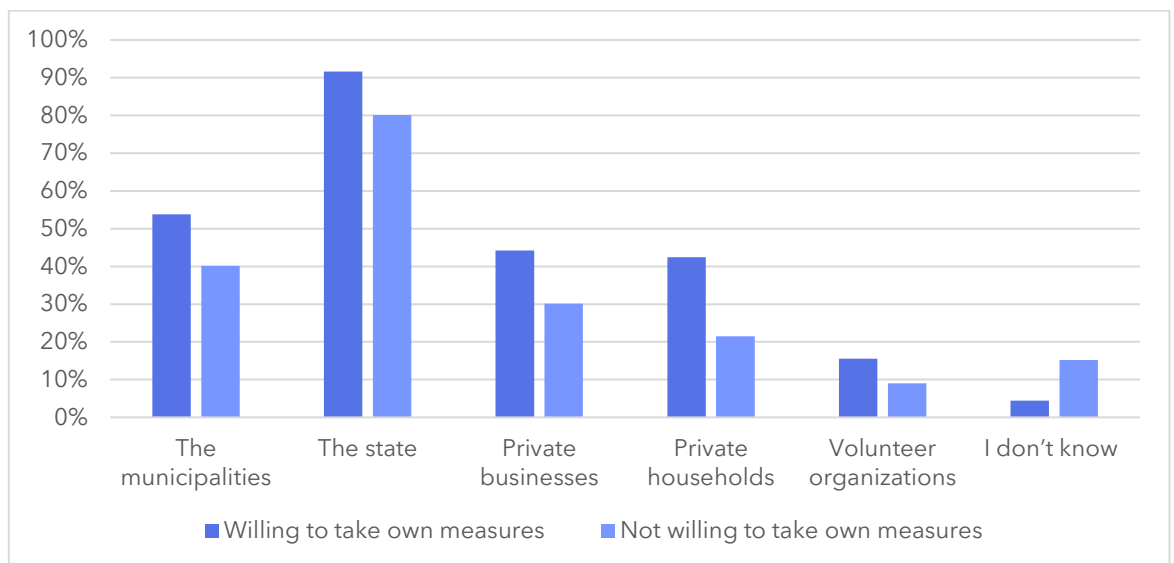


Figure 28: Who do you think is responsible for securing us against the future consequences of climate change (more storms, landslides, floods, droughts and storm surges)? You can pick more than one alternative. Responses categorized over those who agree at least ‘partly’ that they can take measures

themselves to protect their property against climate change, and those who do not, in percentages. Year: 2020. N = 1980. Source: Norwegian Citizen Panel

Most agree that they can take own measures

A large majority of the respondents – 8 out of 10 – acknowledge that they themselves can take measures to protect their property against the consequences of climate change, see Figure 29. This is interesting to compare to the previous question (figure 19), on the division of responsibility, where only 4 out of 10 perceived that private households are responsible. A lot of respondents acknowledge that they can undertake measures to protect their property, even if they do not believe that they are responsible for this.

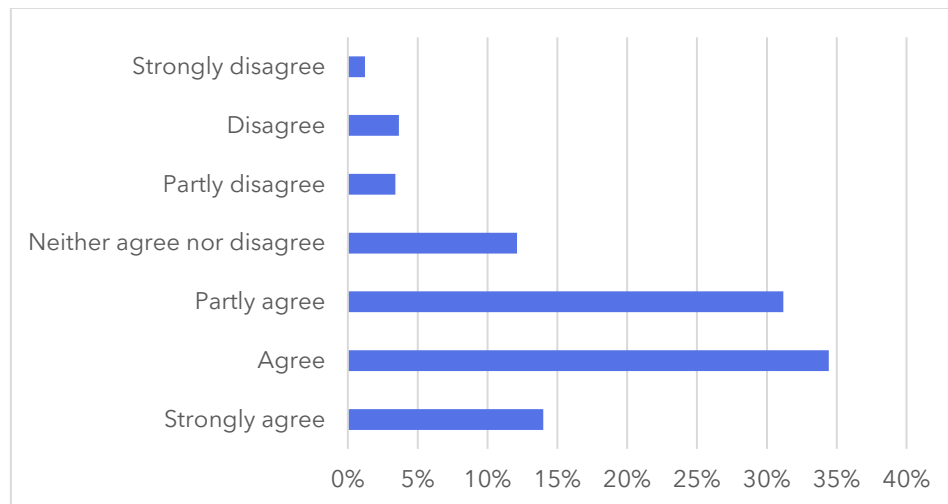


Figure 29: How much do you agree or disagree that you can take measures that help to protect yourself and your property against the consequences of climate change? Responses in percentages. Year: 2020. N=1966. Source: Norwegian Citizen Panel.

A higher share of young people disagree that they can take own measures

The majority in all age groups agree at least ‘partly’ that they can take measures themselves, see Figure 30. The differences between age groups are negligible when looking at the share of positive respondents (those who at least ‘partly agree’). However, the share of respondents *disagreeing* is larger among the young respondents. 13% of the youngest respondents disagree at least ‘partly’, as opposed to only 6% and 9% of the older age groups.

As the literature shows that young people tend to be more positive to climate measures in general (Aasen, Klemetsen, and Vatn 2022), and more concerned about climate change, as depicted in figure 2, a possible explanation relates to the life circumstances of younger people, and the fact that they more seldom own their own property. According to CICERO’s climate survey, only 54% of respondents under the age of 30 own their own house or is a unit holder in a housing association (the Norwegian ‘borettslag’), while the same is the case for 88% of those between 30-59 years old, and 96% of those over 60. However, as the next chapter illustrates, young respondents are also less inclined to agree that government’s climate change adaptation efforts should increase, so it is also possible that older age groups are more positive to adaptation efforts (not necessarily in the context of climate change, but as general emergency preparedness measures, general maintenance, etc.).

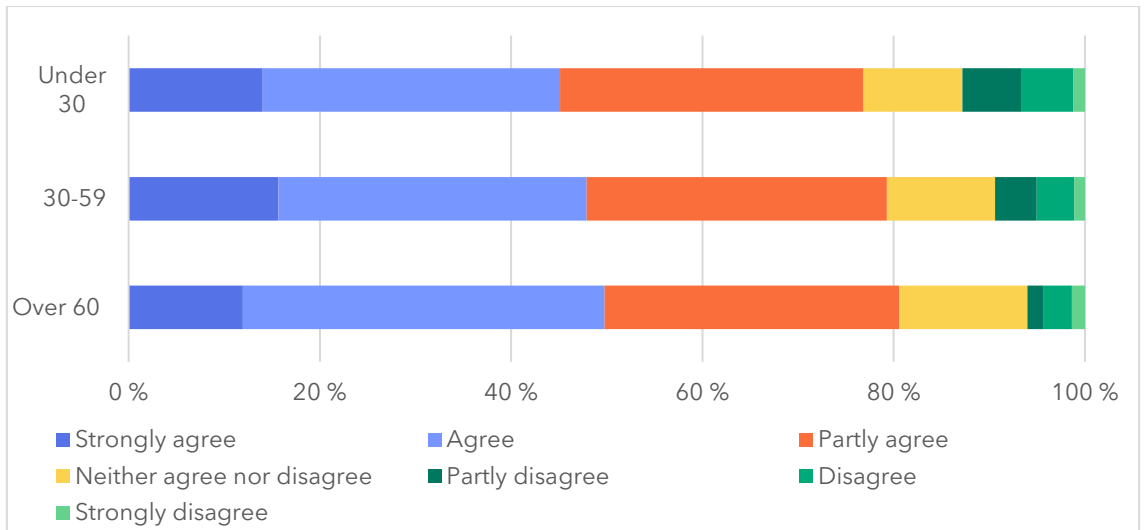


Figure 30: How much do you agree or disagree that you can take measures that help to protect yourself and your property against the consequences of climate change? Responses per age group, in percentages. Year: 2020. N=1966. Source: Norwegian Citizen Panel.

The south of Norway more positive to taking own measures

The majority of respondents in all Norwegian regions acknowledge that they can take some measures themselves, see Figure 31. Yet, there are some regional differences, as a larger share of the respondents in the south of Norway acknowledge this, compared to in the other regions. By summing up the respondents that weakly agree (partly or more), the share of respondents agreeing is lowest in Trøndelag and Oslo. If we only sum up the respondents that 'agree' or 'strongly agree', Trøndelag stands out with the lowest share of 40%, compared to 56% in the south.

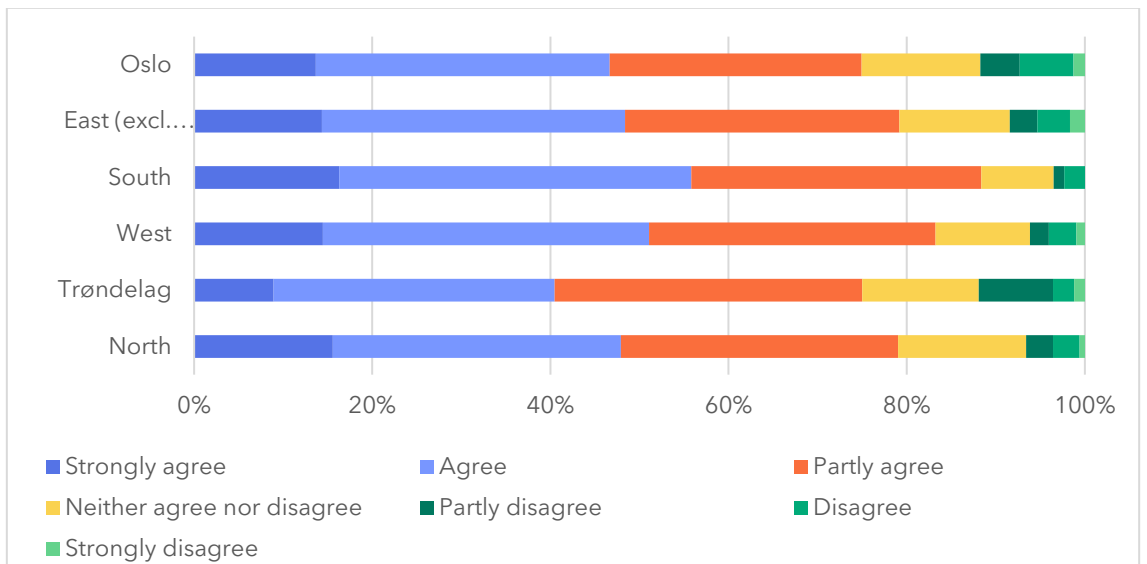


Figure 31: How much do you agree or disagree that you can take measures that help to protect yourself and your property against the consequences of climate change? Responses per region, in percentages. Year: 2020. N=1966. Source: Norwegian Citizen Panel.

High income groups more positive to taking own measures

As figure 32 illustrates, the majority across all income groups acknowledge that they can take some measures themselves ('strongly agree', 'agree' or 'partly agree'). However, the share among the lower income groups is slightly lower: Among those with annual

income before tax under NOK 300 000, the share agreeing ('agree or 'strongly agree') is 44%, while among the two upper income groups 55% agree.

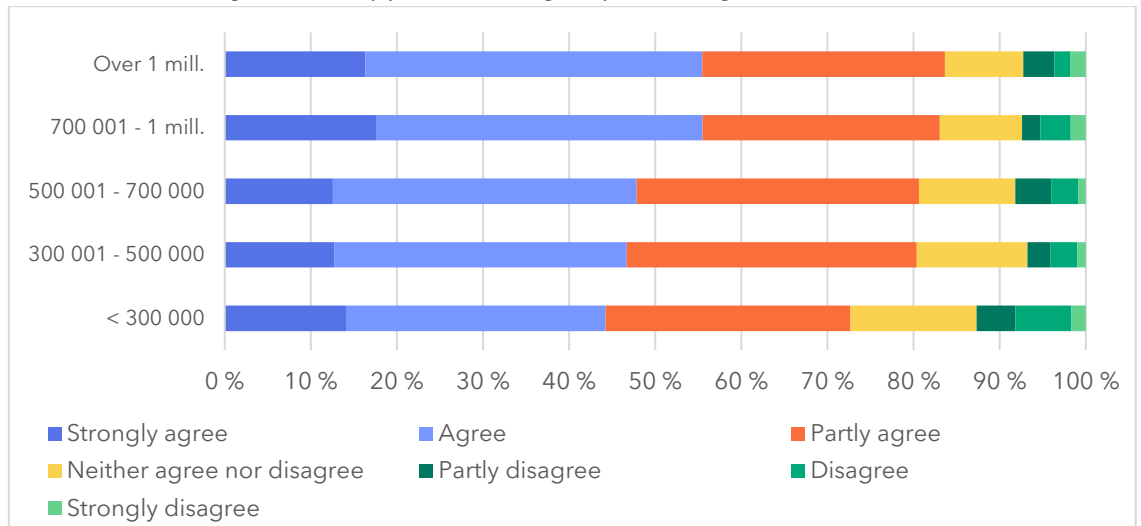


Figure 32: How much do you agree or disagree that you can take measures that help to protect yourself and your property against the consequences of climate change? Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 569 900 was the average in Norway in 2019. Year: 2020. N=1927. Source: Norwegian Citizen Panel.

Male and female respondents view their possibilities to take measures about the same, as 81% of men and 78% of women agree to some degree. Finally, there are some slight differences between respondents with different education levels. Among those with compulsory school as their highest obtained education, the share who agree to some degree that they can take some measures themselves is 72%, whereas the share among those with upper secondary school is 78%, and 81% among those with higher education. However, the majority of all education groups acknowledge that they can indeed take some measures to help protect their own property against the consequences of climate change.

We have also performed ordered logistic regression analysis, see Table 1 in the Appendix. The main statistical findings described above are confirmed: Respondents over 50 years of age are more inclined to agree that they can take own measures than those between 30-40 (and compared to those under 30 if we change the reference group).¹³ The respondents in the two highest income groups (with annual income before tax over NOK 700 000), are also more inclined to agree that they can take measures than the lowest income group (under NOK 300 000). The same holds for respondents with income between NOK 500 000-700 000, compared to the lowest income group, but this finding is only weakly significant. Women are also more inclined to agree that they can take such measures than men. And finally, respondents residing in the south and the west of Norway are more inclined to agree that they can take such measures, compared

¹³ Note that we are not able to control for whether the respondents own their own property in the survey data from the Norwegian Citizen Panel from 2021. It is likely that people who own their own property tend to be more willing to take own measures. This might induce some bias that may inflate the estimated differences between the groups that more often own their own property and those who less often do, such as older age groups and higher income groups compared to the youngest group and the lowest income group (i.e., the estimated differences between e.g., older age groups and the youngest age group may be overestimated, seeing as a part of the explanation of may be related to the fact that they own their own property, rather than their age). The results should thus be interpreted in a descriptive way (e.g., 'older age groups are more often willing to take own measures than young age groups', rather than in a causal way ('willingness to take own measures increases with age')).

to the reference group in Oslo (as well as other regions, if we change the reference group). The differences between education groups were not statistically significant.

1.5 Incentivizing measures to reduce risk

Despite the relatively low concern for property damage, a majority of the respondents in the Norwegian Citizen Panel agree that they can undertake measures to protect themselves and their property against consequences of climate change (Figure 29).

In the Norwegian Citizen Panel from 2022, respondents were further asked to focus on increased precipitation, flooding, and surface water, and consider what would be required for them to undertake measures that would protect their property against damage from this type of extreme weather/climate change. This question was only asked respondents that report owning their home. Examples of measures mentioned include waterproofing and moisture barriers for basements, roofs and facades. Figure 33 shows that information about measures that can be carried out to reduce risk is pointed to as an important factor to incentivize action by the largest share of property owners. More than half of the respondents chose this alternative. The second most popular factor is economic support for undertaking measures (chosen by 40% of respondents). A large share (36%) pointed to information about their neighbourhood being particularly exposed to flooding or surface runoff as an important factor. Information about costs of measures (chosen by 27% of respondents) appears to be more important than information about typical damage costs (chosen by 15% of respondents).

32 percent of property owners in the survey state that rewards through improved insurance conditions can contribute to incentivizing measures. From 2012 to 2021, over half of the total compensation payments from Norwegian insurance companies were related to precipitation and flooding (Finans Norge, 2022). Damage from floods and landslides is covered by the Norwegian natural damage pool, while other precipitation-related damages (such as blockages in drainage systems, backflow, and water intrusion) are covered by individual insurance companies. The latter category represents the largest share of precipitation-related damages, and compensation for this type of damage is increasing (NOU 2018:17). Private insurance policies can provide incentives for preventive measures through deductibles and risk-based premiums. A study by SINTEF shows that this is being done to varying degrees, and to a lesser extent in home insurance for households (Sandberg and Bjelle, 2021). The survey responses from the Norwegian Citizen Panel indicate that there may be potential for insurance companies to provide greater incentives for damage prevention.

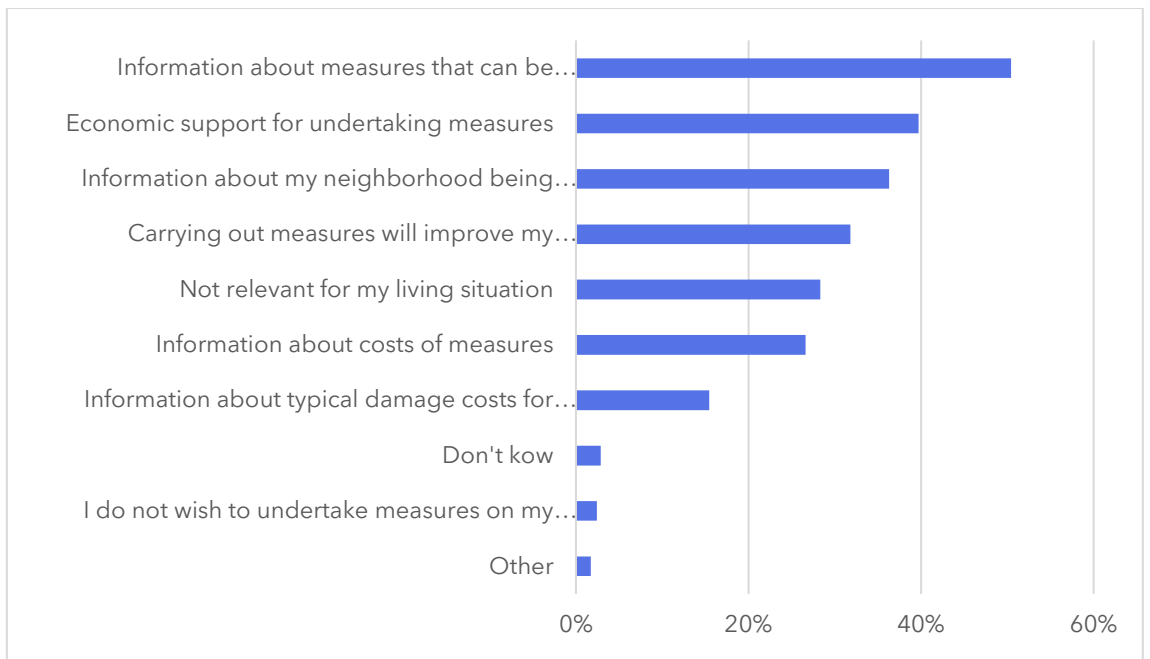


Figure 33: What would be required for you to undertake measures to protect your property against increased precipitation, flooding, and surface water? Respondents could choose more than one alternative. Weighted shares. Year: 2022. N=1984. Source: Norwegian Citizen Panel.

As discussed in Chapter 1.5, municipalities play a central role in climate adaptation work, including as planning authorities and owners of infrastructure affected by climate change, as well as authorities responsible for emergency preparedness (Sandberg and Bjelle, 2021). At the same time, everyone who owns private property has a responsibility to secure their own property. A relatively large proportion of respondents report that the question of measures to secure their own property is not relevant to their housing situation (28% of respondents). This may be due to a lack of perceived risk of damage from precipitation, flooding, and stormwater, or for other reasons it may not seem relevant to make decisions about implementing measures. Therefore, we have looked more closely at how the responses are distributed across different types of housing. The results are shown in Figure 34.

Among respondents who live in apartment buildings, it is less relevant, not surprisingly, to implement measures to reduce the risk of damage compared to other homeowners. The housing cooperative or joint property association is usually responsible for maintenance of external areas, including drainage. Among owners of semi-detached, terraced houses or similar, the pattern is relatively similar, with a focus on the need for information about measures that can reduce risk. At the same time, we see that a very small proportion of respondents in all three housing categories report that they do not want to implement measures on their property.

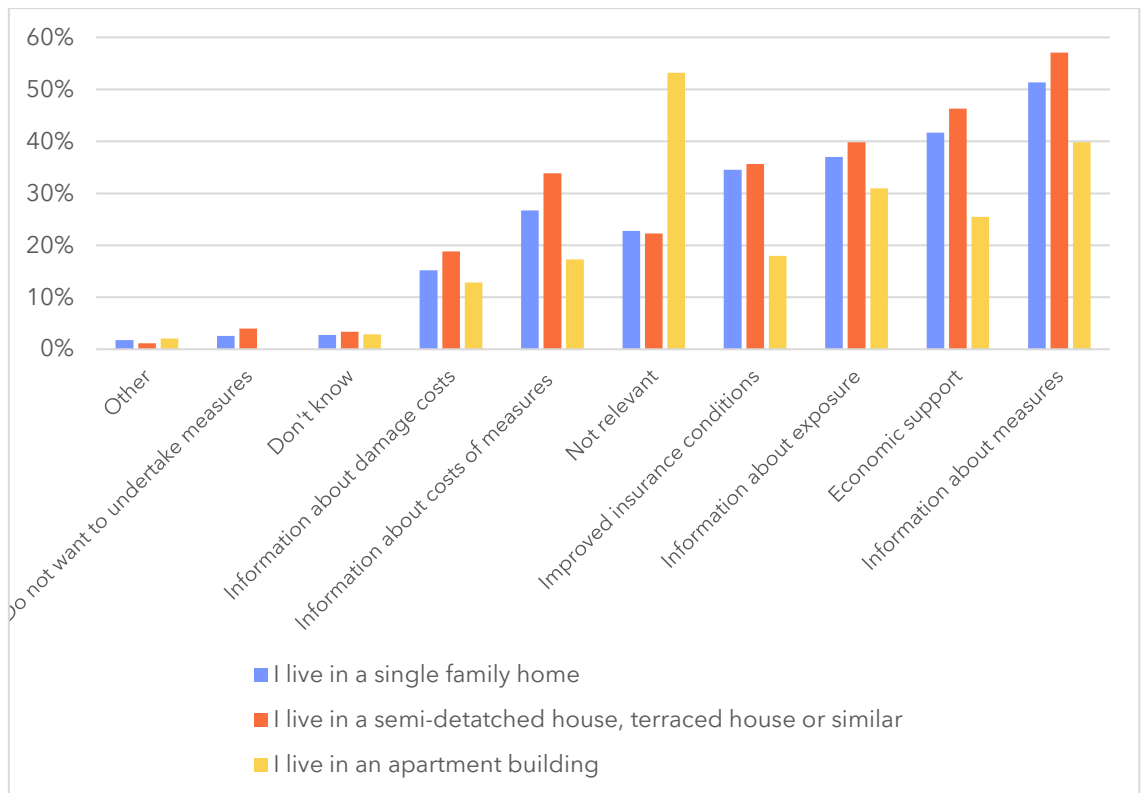


Figure 34: What would be required for you to undertake measures to protect your property against increased precipitation, flooding, and surface water? Respondents could choose more than one alternative. Weighted shares by type of home. Year: 2022. N=1984. Source: Norwegian Citizen Panel.

1.6 Are the authorities doing enough?

8 out of 10 respondents believe that the government should increase their preparedness efforts against the direct local consequences of climate change such as longer periods of rain. The same share believes we should do more to prevent the indirect consequences of climate change, such as failing food production. Older age groups and those with higher education more often agree that the authorities must increase the preparedness efforts. Only 5 out of 10 respondents trusts that the authorities will take the necessary climate adaptation measures. Trust in the authorities on this issue is higher among older age groups, in the south of Norway, those around the average earning level and women.

The majority thinks the authorities are not doing enough

A clear majority (84%) of the respondents at least 'partly' agrees that the government should increase their efforts to prepare against the direct local consequences of climate change, even if this means less funding for other important local issues, see Figure 35 ('strongly agree', 'agree' or 'partly agree'). A majority (56%) even states that they are clearly in agreement with this ('strongly agree' or 'agree'). Only 5% disagrees (or 3% if we only consider those who answer 'strongly disagree' or 'disagree'). The overall finding is thus that most respondents do not think the authorities are doing enough today.

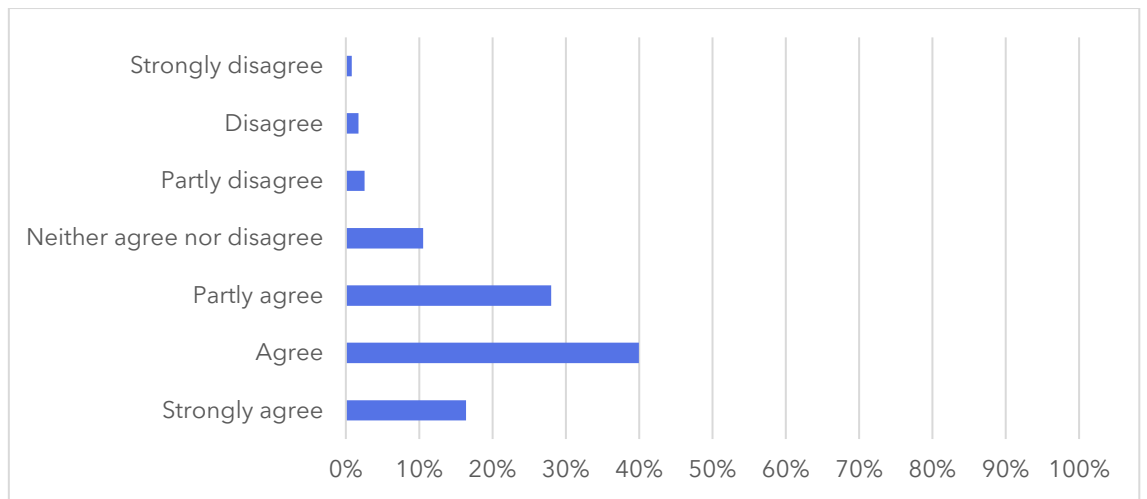


Figure 35: How much do you agree or disagree that the authorities must increase their efforts to protect us against the direct local consequences of climate change (storms, landslides, floods, droughts and storm surges), even if this means that there is less money for other important purposes locally? Responses in percentages. Year: 2020. N = 1961. Source: Norwegian Citizen Panel.

Older age groups particularly call for increased government efforts

A clear majority of all age groups agree to some degree that the authorities should increase their preparedness efforts, see Figure 36. Nevertheless, a larger share of the respondents over 60 (63%) 'strongly agree' or 'agree' that this is called for, compared to those under 30 (49%). As Figures 2 and 8 showed, older age groups report lower climate concern and experience with climate change, and the literature typically finds that young people tend to be more positive than older age groups to policies and measures to reduce emissions (Aasen, Klemetsen, and Vatn 2022). Thus, this finding is a bit unexpected.

A possible explanation is that young people are less positive to climate adaptation measures than climate measures in general. However, as the majority across all age groups to some degree is positive to increased efforts, a more natural interpretation is that older age groups are particularly positive to climate adaptation efforts. It may be that that older age groups view such measures as important, regardless of climate change. Climate adaptation measures such as creating green spaces, upgrading roads, pipes and buildings according to standards, avalanche protection, etc., may be viewed as general emergency preparedness measures, general maintenance (and the backlog much debated in Norway), well-being measures, or similar. Older age groups may be more concerned with such issues, regardless of the climate change context. Finally, a possibility is that older age groups in average have more responsibilities in terms of owning their own house (or a share of the house).

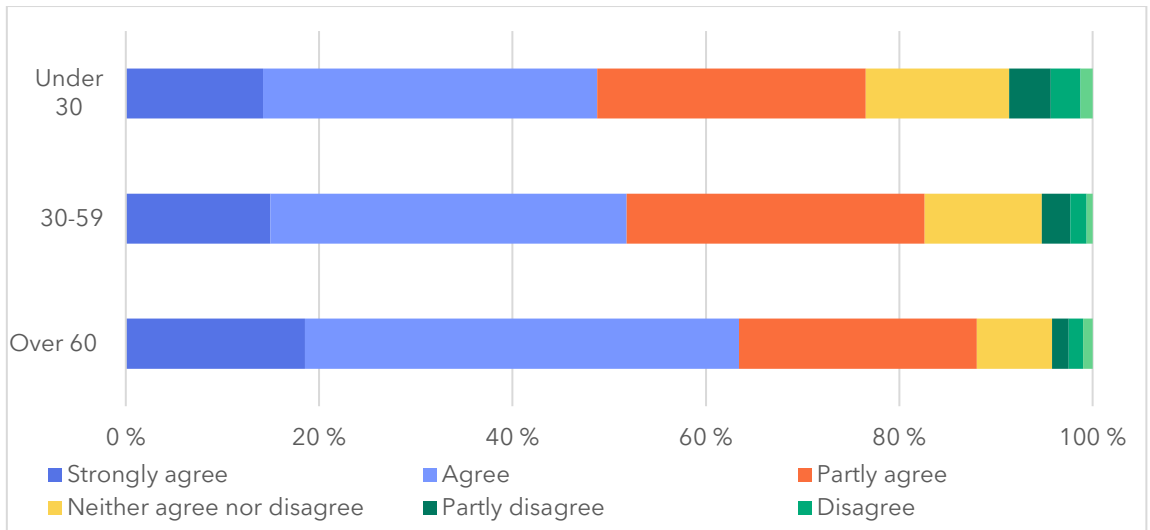


Figure 36: How much do you agree or disagree that the authorities must increase their efforts to protect us against the direct local consequences of climate change (storms, landslides, floods, droughts and storm surges), even if this means that there is less money for other important purposes locally? Responses per age group, in percentages. Year: 2020. N = 1961. Source: Norwegian Citizen Panel.

Minor differences between regions, income groups and education groups

Most respondents in all regions agree to some degree that the authorities must increase their preparedness measures, see Figure 37. The differences between the regions are minor, but a larger share of the respondents in Trøndelag agree strongly, and a slightly lower share of the respondents in the South agree ('partly agree', 'agree' or 'strongly agree').

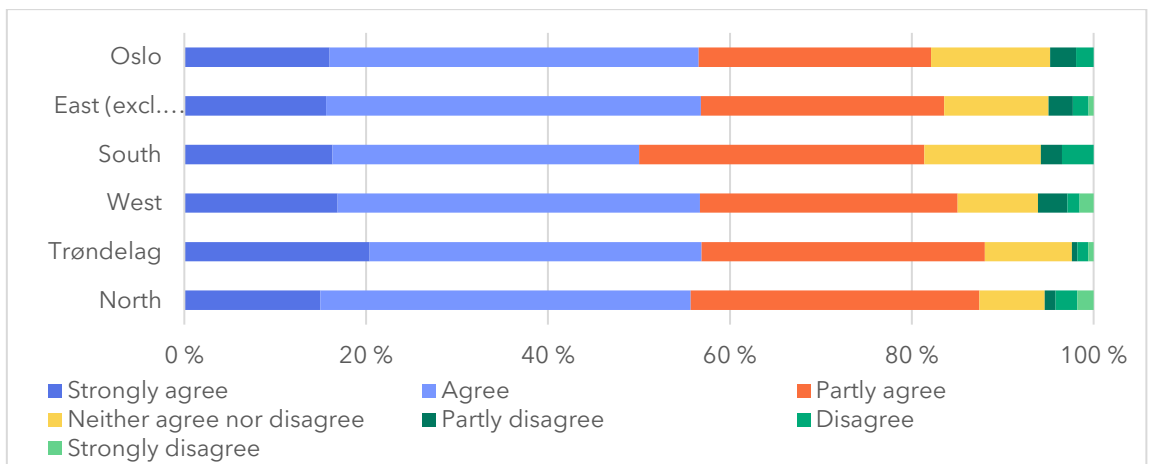


Figure 37: How much do you agree or disagree that the authorities must increase their efforts to protect us against the direct local consequences of climate change (storms, landslides, floods, droughts and storm surges), even if this means that there is less money for other important purposes locally? Responses per region, in percentages. Year: 2020. N = 1961. Source: Norwegian Citizen Panel.

The differences between the income groups are not so clear, see Figure 38. While a larger share of the three lowest income groups strongly agrees that the authorities must increase preparedness efforts, the results otherwise vary (i.e., are not linear). The largest share of respondents disagreeing ('partly disagree', 'disagree' or 'strongly disagree') is within the highest and the lowest income groups.

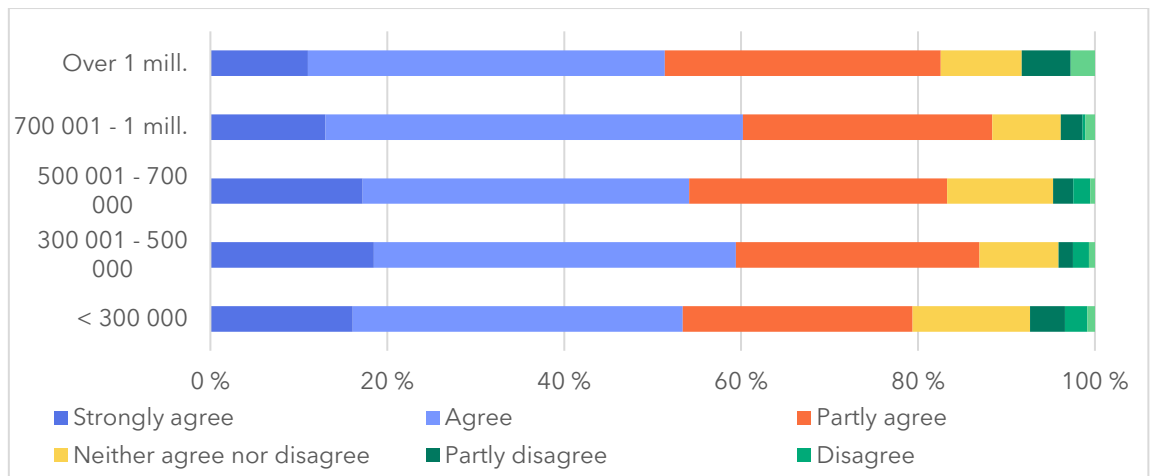


Figure 38: How much do you agree or disagree that the authorities must increase their efforts to protect us against the direct local consequences of climate change (storms, landslides, floods, droughts and storm surges), even if this means that there is less money for other important purposes locally? Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 569 900 was the average in Norway in 2019. Year: 2020. N = 1922. Source: Norwegian Citizen Panel.

There are no gender differences in this question, as a vast majority of both men (84%) and women (85%) at least 'partly' agree that preparedness efforts must increase. However, a slightly higher share (87%) of the respondents with higher education agree that preparedness efforts must increase, compared to those with compulsory education (76%).

Indirect consequences just as important

The consequences of climate change can be categorized in direct and indirect risks. The direct consequences refer to the physical processes, i.e., how potential changes in frequency, intensity, and duration of weather and climate events trigger a range of climate impacts, while the indirect consequences refer to a multitude of interactions triggered by the direct, and then cascading through social, ecological, political, technical, or physical processes (Selseng, Klemetsen, and Rusdal 2021).

A clear majority (83%) of the respondents at least 'partly' agrees that the authorities should increase their efforts to prevent the indirect consequences of climate change, see Figure 39. In Figure 35, we saw that 84% believed the same about the direct local consequences of climate change. Hence, there is no reason to believe that people find it less important to prevent the indirect consequences - such as failing global food production - than to prepare against the direct consequences of climate change - such as infrastructural damage to buildings after longer periods of rain.

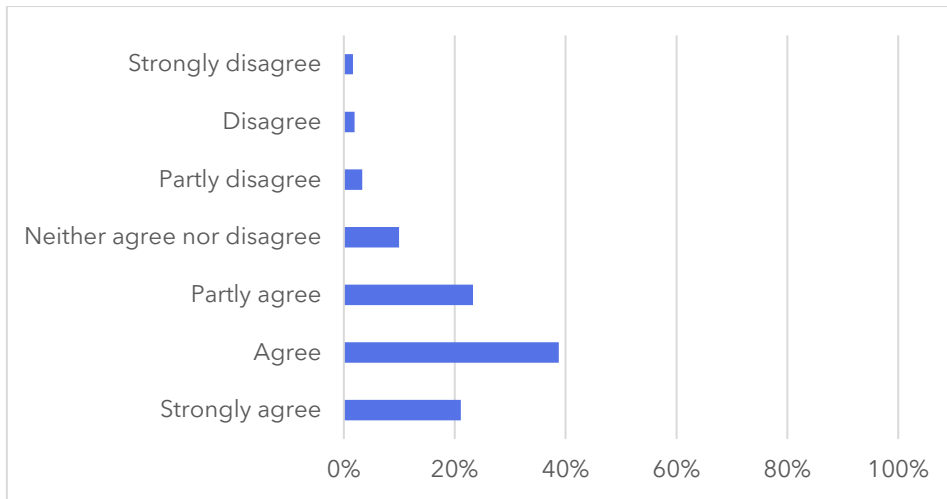


Figure 39: How much do you agree or disagree that the authorities must increase their efforts to prevent the indirect consequences of climate change, such as declining global food production, even if this means more expensive food? Responses in percentages. Year: 2020. N = 1951. Source: Norwegian Citizen Panel

The majority trusts the government to take measures

A majority (56%) trusts to some degree that the authorities will take the necessary climate adaptation measures, see Figure 40. On the other hand, 30% report some degree of mistrust in the authorities on this. The level of trust in the government in this field appears to be significantly lower than the level of *general* trust in the government. According to a national survey 85% of Norwegians had fairly high or high trust in the government in 2020 (Ipsos 2020).

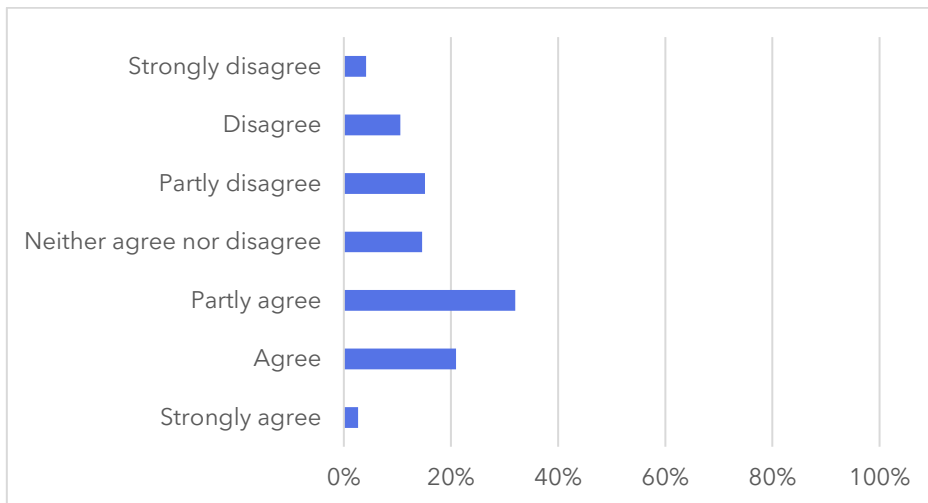


Figure 40: I trust that the authorities will take the necessary measures to protect the population from the negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges). Responses in percentages. Year: 2021. N = 1935. Source: Norwegian Citizen Panel.

Higher trust among older age groups and people in the south

A majority across all age groups have some degree of trust that the government will take the necessary measures, see Figure 41. However, younger people report lower average trust: While 51% of respondents under 30 at least 'partly agree', this is the case for 54% of those between 30-59, and 58% of those over 60. Among those under 30, 4 out of 10 respondents disagrees at least 'partly' that they trust the authorities on this issue.

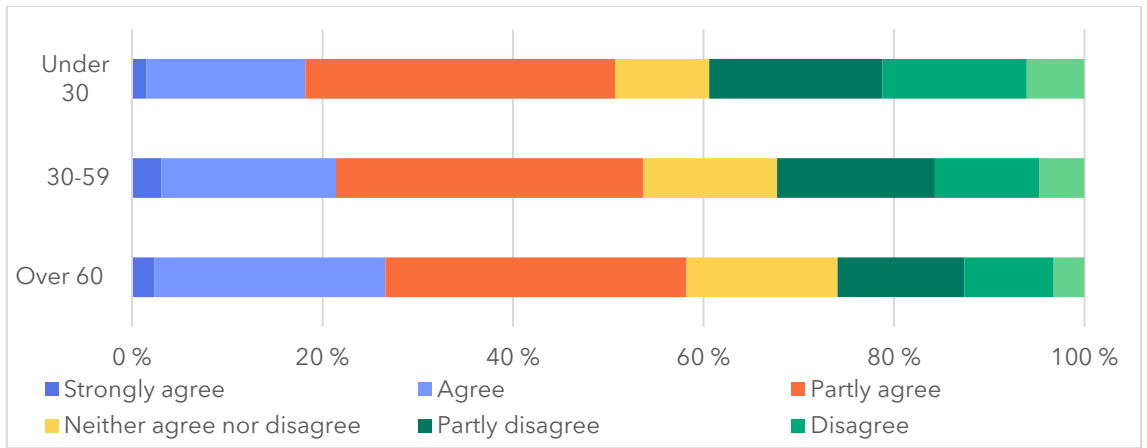


Figure 41: I trust that the authorities will take the necessary measures to protect the population from the negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges). Responses per age group, in percentages. Year: 2021. N = 1935. Source: Norwegian Citizen Panel.

The majority in all regions have some degree of trust that the government will take the necessary climate adaptation measures, see Figure 42. However, respondents in the south report the highest trust: While 31% of the respondents in the south 'agree' or 'strongly agree' to the statement, this is the case for 19%, 20% and 21% of the respondents in the north, Trøndelag and the west.

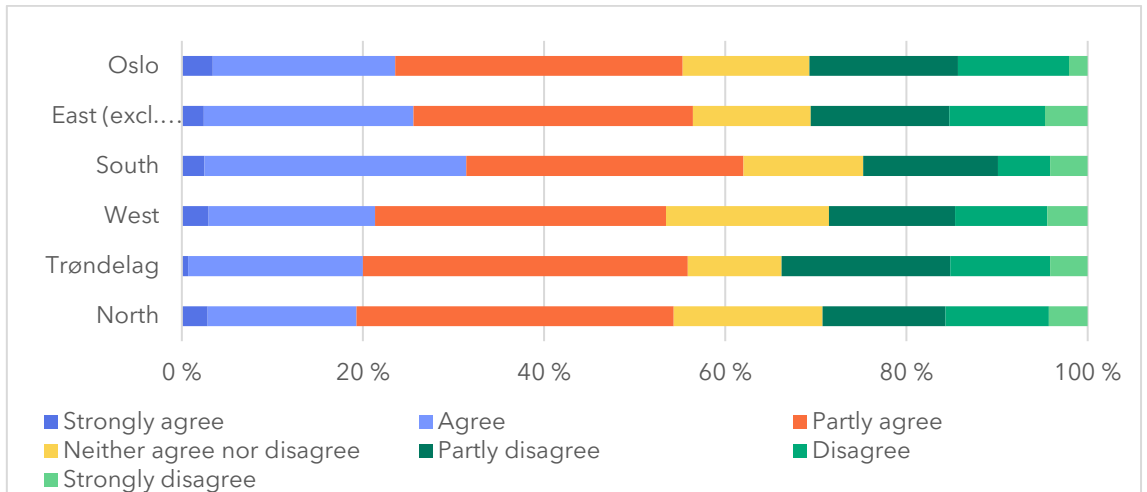


Figure 42: I trust that the authorities will take the necessary measures to protect the population from the negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges). Responses per region, in percentages. Year: 2021. N = 1935. Source: Norwegian Citizen Panel.

Slightly higher trust around the average income level

A majority across all income groups report that they have some degree of trust that the government will take the necessary measures, see Figure 43. There are some minor (and non-linear) differences between income groups, as the respondents around the average earning level report the highest trust in the authorities. The trust is also somewhat lower among the respondents who do not report their earning (not displayed in the graph).

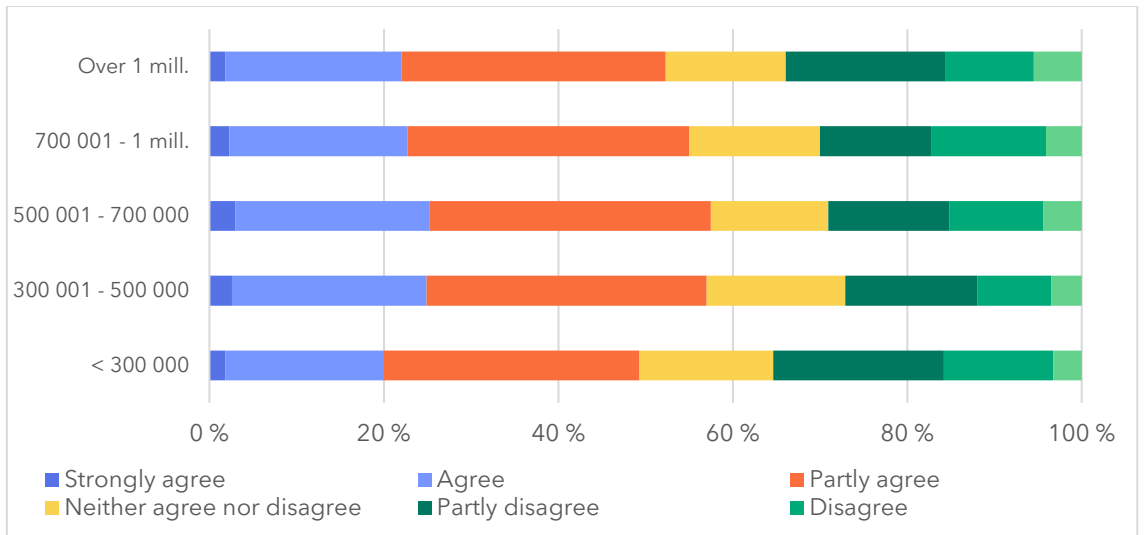


Figure 43: I trust that the authorities will take the necessary measures to protect the population from the negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges). Responses per income group (annual income before tax, in NOK), in percentages. Statistics Norway (2022): NOK 587 600 was the average in Norway in 2020. Year: 2021. N = 1561. Source: Norwegian Citizen Panel.

Women report slightly higher levels of trust in the authorities on this issue, compared to men, as 59% of women at least ‘partly agree’ whereas the same share for men is 52%. The respondents with higher education also report slightly higher trust levels (57% at least ‘partly agree’) than those with compulsory school as their highest completed education (51% at least ‘partly agree’).

As Figure 44 shows, there are some small differences in trust between those respondents who believe they already see serious negative consequences of climate change in Norway, compared to those who believe otherwise (that the consequences occur further into the future, or that they never will occur). Among those who believe we notice the consequences already, a larger share is ambivalent or indifferent (18% vs. 11% answer ‘neither agree nor disagree’) and a slightly lower share trust the authorities (53% vs. 58% answer ‘strongly agree’, ‘agree’ or ‘partly agree’).

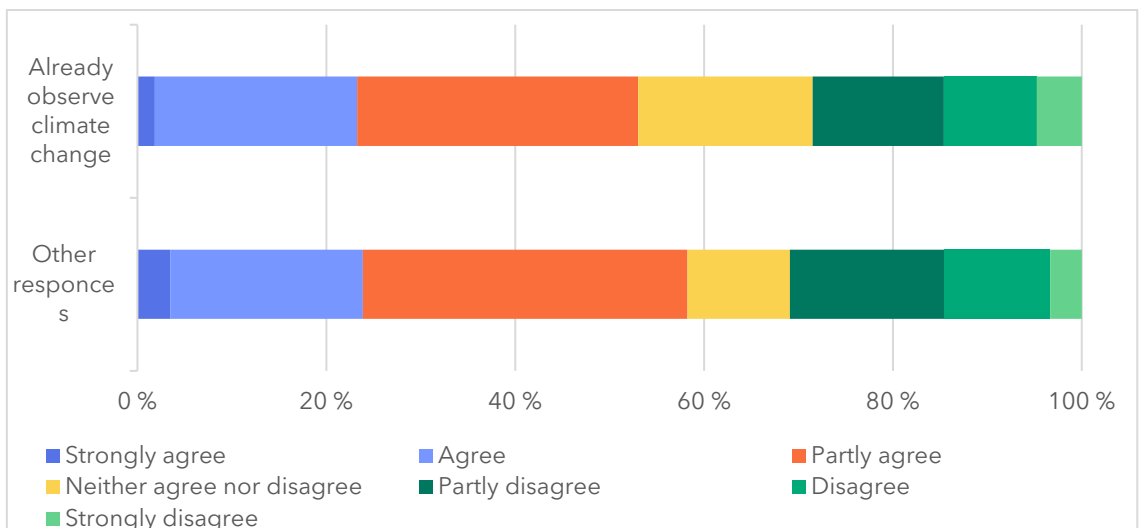


Figure 44: I trust that the authorities will take the necessary measures to protect the population from the negative consequences of climate change (more rain, drought, storms, landslides, floods and storm surges). Responses categorized over the respondents who believe that we already observe serious negative consequences of climate change, and those who do not expect such consequences, or believe they are further ahead in time (displayed in fig. 11). Year: 2021. N = 1935. Source: Norwegian Citizen Panel

2. Results from qualitative interviews with insurance employees

2.1 Introduction and methods

A total of 9 interviews were conducted over Microsoft Teams from three different companies from the insurance industry. For an overview of the informants' job description, arranged in chronological order of the interviews, see **table 1** below. A general interview guide was developed beforehand in dialogue with Mitigate, and the use of the interview guide was adapted according to the position of the interviewee. Contact with the relevant companies and interview participants was facilitated by Mitigate.

Interview number	Job description
#1	Claim handler
#2	Claim handler
#3	Appraiser/taxperson
#4	Claim handler (prev. appraiser)
#5	Claim handler
#6	Sales
#7	Sales
#8	Claim handler
#9	Claim handler

Table 1: Interview overview, sorted in chronological order

The main aim of these interviews was to improve understanding of insurance customers through interviewing different kinds of employees in the insurance industry about their experiences with customer contact, with particular attention to levels of preparedness for flooding and urban runoff (FUR). The following section presents findings sorted through headings from major points of interest for the project and/or important findings that

have surfaced through data collection and analysis. The aim of this section is not to provide results that are statistically representative for a given population. Instead we seek to give in-depth understanding of how informants that have been working close to homeowners over time, understand and explain the situation. This approach builds on a principle of *analytical generalization* where generalisation is based on a reasoned judgement about how relevant claims are and to what extent they may occur in other situations or cases (Yin 2003). As is common in qualitative research, quotes are meant to illustrate and elaborate key points in the text. All interviews were conducted in Norwegian and transcribed. Any quotes have been translated into English by the authors.

Limited knowledge about insurance terms and coverage

“...reading the terms and conditions is so complicated so I understand that [people don’t read their policy documents]. Even we’re sitting here at times, having worked with this for many, many years, scratching our heads while reading the terms to determine what is covered and what isn’t covered – then you find an exception, and then there’s an exception to the exception...So, even us who do this for a living find it difficult, right? We end up calling the claim handlers to ask: “What do you do in practice if this and that happens?” (Interview #6, sales).

- Insurance is a “low interest” product, most commonly expressed by customers not reading their insurance policy. However, as the above quote also testifies, there is also recognition that the insurance documents are at times more complex than they should be. This has several fundamental implications:
 - o Salespeople and claim handlers are in a conflicting relation: Claim handlers are often frustrated by the partial picture given to customers by salespeople, who focus only on what is covered and skirting over what may not be covered, to make the sale.
 - o Customers are therefore often unaware of any limitations in coverage or conditions that can reduce payout (neglecting maintenance, old roofs, etc.).
 - o This is further related to the insurance companies generally enjoying high levels of trust from customers, a point which was also confirmed directly through the interviews. Yet the disappointment, if not outright anger, occasionally expressed by customers when told that their payments will be reduced or a certain type of damage is not covered, also indicates that the current levels of trust can be problematically high in some instances.

2.2 Limited preparedness for flooding and urban runoff

“I don’t think [FUR preparedness] is at the forefront of people’s minds (...). People keep their stuff directly on their basement floor and think “this isn’t going to affect me” (Interview #5, claim handler).

I don’t have an impression that people are particularly prepared [for FUR] or that they do much [to prepare], like, you hear about some who maybe improve the drainage around their house, but I believe most people think “this is just how my house is, we’ll just have to deal with whatever comes”, in a way. So, it’s very rare that I encounter any

*prevention. Maybe there should be much, much more of that”
(Interview #6, sales).*

- There is a general impression that customers’ preparedness and knowledge related to climate change adaptation is low, although with some variation.
 - o In general, the awareness of connections between insurance and climate change is low, as is the technical knowledge needed to implement any preventative measures
 - o Technical knowledge and ability for prevention was mentioned as low in urban areas, whereas as people in rural areas were more knowledgeable and proactive, and especially farmers were mentioned as active in implementing preventative measures.
 - o Media attention recurred as an important point for increasing awareness among customers
 - o Incentives for implementing preventative measures for FUR are currently low or non-existent (i.e. in terms of both “sticks” (e.g. raising premiums) and “carrots” (e.g. (lowering premiums)). However, this is in line with the very low level of individualisation of private property insurance in general (see quote #4)

“Yeah, we tried many years ago [to differentiate insurance premiums by area], where sent a message to the customers notifying them that their premiums would go up because they they were living in an area that had poor profitability, for example (...) what happened was that everyone went over to the competition, right (...) we can’t be thinking that you should pay more because you live out in the sticks compared to those living more centrally in cities. It’s too hard to differentiate, costs a lot to administrate and will be a bit too bureaucratic. If you have a system where everyone pays an equal amount based on the size of your house, it’s easier to...I think the natural perils arrangement is well targeted. If there is an event, the government and the insurance industry will step up” (Interview #4, claim handler).

2.3 Mixed interest for climate change among insurance industry employees

- There is also mixed interest and knowledge about climate change among the interviewees (claim handlers, appraisers¹⁴ and salespeople, see table 1). Currently, there seems to be little systematic incorporation/institutionalisation of climate change concerns in the everyday work of private home insurance, which in turn makes personal interest and engagement a significant factor in accounting for increasing risks related to FUR in day-to-day interactions with customers as well as disseminating knowledge to customers on a more informal basis. The two salespeople make striking contrast here, with one describing themselves as very engaged, while the other emphasised that their work is currently structured in a way that gives limited focus on climate change in general:

“We’re seeing basement flooding after extreme rains, loads of old wooden houses in Norway that are getting more and more moisture and a lot of old roofs, damages stemming from water leaking through roofs and outer walls into basements. There’s more and more of those

¹⁴ Takstmenn

kinds of damages, so we've noticed that customers are increasingly aware of this as well, right, because their getting damages now that they've never had before (...) so you get more and more aware, and we're using this actively in trying to adjust our products to cover some of these damages, right? As a company we're trying to get some of these new issues in, and we salespeople and advisors put a lot of emphasis and focus on covering a lot of these damages (...) and that's stuff that the customers really respond to, like: "oh, really, that's great. You're covering damages from water coming in through a leaky roof, that's something starting to happen more often so we want that included". There's a lot of stuff like that (Interview #6, sales).

(...) "we've got access to [a system] called "Real Estate Value" (Eiendomsverdi), which at least for newer homes gives us information about the [property] location. But climate-wise there's little info, so I don't know, that's not something we look for or have any access to. I don't really know what we might...no, it's rare that we ask the customer about any climate-related measures because that hasn't been relevant – not for pricing nor coverage, unfortunately" (Interview #7, sales)

2.4 Individualising insurance: currently limited by administrative costs

- Current individualisation of homeowner's insurance is very limited and has arguably decreased from previous years (which some mentioned as being unfortunate). This was mainly attributed to personnel and administrative costs, indicating an opening for an automated solution:

"...I'd almost go as far as saying we had better control over the condition of houses before than we do now. But it's a bit of a cost-benefit issue, because there was a time when you needed to have your residence checked before you could get the premium coverage (superforsikring) (...) then they counted the costs, which included paying for thirty employees to cover the entire country. That made it better to give everyone who asked for it premium coverage, although we get a few skeletons in the cupboard, but that's less expensive than keeping thirty people on payroll plus administrative costs. So it was a cost-benefit issue: we're more on speeding things up and asking few questions, and out of a hundred coverages we get one or two skeletons in the cupboard. We just pay for those" (Interview #4, claim handler/appraiser).

"(...) customers who really are on the front foot and do something long before they get any damages, they feel that "yeah, but I've done what I should and then there's these slowpokes in the neighbouring municipality that haven't done a single thing and we pay exactly the same premium. Like, exactly the same - why?". I hear that sometimes, and it makes you think...it's different abroad, where they say "you're decreasing the incentive for each individual customer to do something", right? That's what I'm told (...) but then I'll say that you can also get a reduced payment (avkortning) and that's, like, the other side

of it, but sometimes I'll hear "can this really be fair?" (Interview #1, claim handler)

- The lack of individualisation was, however, mentioned as a point of frustration for the most forward-thinking customers, since they have no incentive to implement measures (See quote #1)
- Moreover, there was broad recognition that climate change related damages may lead to increased premiums, greater individualisation of premiums and coverage in the future. This also includes a greater variety of insurance products due to increased differences in the way various risks are priced.
 - o One finding that indicates the opposite trend is that the natural perils pool is considered to increase solidarity which was connected to "the Norwegian model", indicating a possible value barrier for individualisation
 - o However, one claim handler also reported frustration from some customers (in rural areas) that even if they implement preventative measures, their share to the NPP is exactly the same
- As of now, salespeople feel that they have very limited information about the conditions of the houses and the properties that they are selling insurance to.

2.5 Salespeople are adaptable, but selling new products requires sales system integration and statistics are useful in informing and convincing customers

- Salespeople are generally willing and able to sell different types of coverage in different ways (they are adaptable), but it needs to be integrated into their systems for them to use it as a selling point, to provide sellers with arguments for the customers:

*"I think that if we had some statistics, like "did you know that those who have made this and that adaptation to their home have so and so much less risk of having their basement flooded?" (...) We like statistics and numbers, right? It's often those kinds of things we need to refer to in order to talk with the customer if they need the product or not. If we had some good statistics or prognoses so that we know, like, "do you know what? In ten years it will be like 'this' so you should do this and that". "That's why we would recommend you to...". We're very adaptable if we know there's something to gain for the customer.
(Interview #6, sales)*

- One salesperson also mentioned that their company had cultivated a climate friendly media profile during the last years, which may make them more motivated to integrate climate related insurance measures such as adaptation into their insurance policy/systems
- Currently even non-climate-related preventative measures only rarely reduce premiums. One example is customers calling to see if installing an (expensive) automatic water shutoff system (e.g. Waterguard), which drastically reduces the chance of water damages, might give them a reduced premium, and then are disappointed when it does not:

"It's a super product that reduces water damages (...) very effectively, and that's not something we give any discount for, even though we absolutely should, right? And we did do that at [insurance company

name] when I was working there twenty years ago, but they don't do that anymore" (Interview #6, sales).

This change of practice was further connected to the previously mentioned simplification of insurance premiums to reduce administrative work.

- Although based on a limited selection with only two salespeople from a single company, it seems integration into the systems they work with, or work through, will be crucial for selling a new product or concept. Further, from a sales point of view, more individualisation of premiums would be welcome, since it gives salespeople more opportunities to use their professional judgement in their work:

"No, I don't, really [see any disadvantages from increased individualisation]. Sure, we'll end up losing some customers that we price out because their risk is too high, but it's actually a good thing because those are clients we don't really want, right, before they maybe do something about that roof or their drainage. So, if we then have the guts to say "OK, until you've fixed this and that, your premium will be this high". They may decline my offer more often, which is negative for me as a seller, but it's positive for [insurance company name] as an insurance company, because they won't be left with the sky-high risk. And in the end, it can be positive for those improve the drainage around their house and have done all those things because then they can a lower premium, so we'll have more customers with a risk that we actually want. So, there's only positives, it's all about having the system with which to do it - that's what I'm thinking (Interview #6, sales).

2.6 Barriers for implementing preventative measures

- Appraisers and claim handlers are generally wary about being specific in their recommendations about preventative measures to avoid liability:

"Yes, that's right, out of fear making a recommendation for a preventative measure that might not be necessary. I've personally demanded that a customer improve their drainage, but when they dug everything up it turned out to be the neighbours waterpipe that was leaking (...) so, I ended up having recommended a 200.000-kroner measure that the customer didn't need. So, we ended up with a responsibility there..." (Interview #5, claim handler)

- One appraiser (Interview #3) also mentioned that their colleague had heard back from a very angry customer that did exactly what he had recommended to prevent further basement flooding, only to have get flooded again only a short time afterwards
 - o This means that customers rarely receive anything other than a general recommendation (improve drainage/gutters/culverts), but the technical solution and implementation needs to be provided by others which the customers are obliged to find and contact themselves
 - o A third-party source of information that is open for the customers to use would also help in this respect, since it would provide an easily accessible

source of info for customers but also avoid/limit liability for the insurance company

- The systems used at each insurance company and sales department (at banks) shape and limit which criteria employees are able to incorporate in their contact with customers, such as climate risk mitigation. Currently, communication about such issues is being limited to the personal engagement of individual employees by the structure of internal systems,
 - o The outsourcing of insurance sales to/through banks has broken down previous communications pathways between claim handlers and salespeople. Previously, one could “sit in” with the other group to learn what their challenges and routines are, but now they both in different firms and locations which makes coordination between the makers of the insurance policy and those who sell the insurance much less frequent and much more difficult to coordinate. This structural issue will be important to keep in mind for anyone attempting to reach customers with new solutions that need to be incorporated into existing insurance policies and company systems.

2.7 Competition between insurance companies: Mainly carrots, few sticks

- Competition between insurance companies was consistently mentioned as a barrier to any one company raising premiums on the back of the reported state of a property (customers will go to a company that has a lower premium)
 - o This also limits individualisation to “positive reinforcement” (i.e. carrots, not sticks) for implemented measures. However, pricing various for cost reductions was mentioned as a challenge. For example, the broader natural conditions surrounding a property will necessarily vary, which again can impact the effectiveness of a risk mitigation measure. This makes it difficult to estimate with certainty how much the measure is worth in terms of premium reductions. This further relates to the abovementioned limitations insurance companies have in making substantive checks of building conditions (administrative costs).
 - o This could be partly solved by cooperating with technical experts to provide quality solutions. But seen in context with the reticence of insurance companies (appraisers) to give advice specific about technical solutions to limited liability to in relation to customers, this kind of integrated solution seems unlikely to happen in the near future. This could, however, provide an opening for other companies (like Mitigate) to facilitate contact with providers of suggested solutions provided by their platform.
 - o “Boligsjekken”, as provided by IF, was described as “ingenious”, as it gave added value for the customers, as well as new information for the company and better basis for giving good advice, also indicating an opening for “added value” services:

“And you see IF being ingenious, they have this thing called Boligsjekken (“the residence check”) that they provide the customer with free of charge, which the customer is extremely happy with (...) they go through, like, a hundred points that may be important for you as a homeowner and check that everything is as it should. And it’s just brilliant for IF get an overview of, is this looking alright as we’re signing an insurance agreement here? So, it’s win-win, ‘cause the customer is super happy to get tips about what you might need to improve, “you should fix that, is there nascent fungal damage, perhaps? (...) If gets all that info about the condition of the house when the agreement was

signed. Everything [damage-wise] that was already started is out on the previous insurance company and they take it from there (...) it costs a fair bit, but in the long run I'm sure there's a reason they've kept it up for so many years" (Interview #6, sales).

2.8 People living close to rivers experience higher risk

- There were few reported customer groups that were mentioned as especially vulnerable. However, one claim handler reasoned that the likely increased premiums and deductibles due to increased climate risk would also make poorer segments of the population opt out of insurance:

"Well, obviously people who aren't well-off might, if worse comes to worst, choose not to insure themselves, for example because they can't afford it and it's not compulsory. Like, they have to have electricity for heating, cooking and washing clothes, they can't cut that, but you can actually cut the insurance premium from your budget, and that might have catastrophic consequences when your house burns down and you're not insured" (Interview #8, claim handler).

- The broadest group of at-risk people was those living close a river (in Lillestrøm and near the major rivers inland). This increases risk of flooding, but is also difficult and costly for private property owners to implement preventative measures against. The municipality would have to take charge, which was reported as unlikely in most cases (although some municipalities are much more on the front foot about adaptation measures than others)
- The western part of Norway was mentioned by the appraiser as more prepared than the eastern part, since the west has more experience with extreme weather than the east. This has also affected their "building culture", making it more weather/climate resistant.
- One claim handler mentioned less well-off customers as having higher expectations about repairs and coverage, also because fewer of those less well-off read their insurance documents. Another claim handler mentioned people in the Bærum area and Møre region as especially demanding regarding the speed at which cases are processed and repairs made by the insurance company. It was further speculated that people in these areas are more impatient because there is a higher proportion of private business owners in these areas, which gives them expectations that things should happen more quickly.

2.9 On future developments in the insurance industry

- Automation and digitalisation are expected to increase in general, with some elements being seen already, such as:
 - o Customers buying insurance by filling out a form online
 - o Sending customers policy information by email linking to web pages
 - o Integrating bank information with insurance.
- All employee groups we spoke with expected premiums and deductibles to increase due to increased climate risk, although customers' awareness was judged to be varied at best, as mentioned previously.
- Expectations of more collaboration with technical experts
- There will be more individualised insurance and this will in turn require more developed systems for segmentation of the customer base
- The latter also implies the need for continued development use of direct and personalized warning systems

- Insurance companies will have an increased need for understanding why things happen and try to learn from FUR incidents:

"I think we at [insurance company name] need to be careful about giving specific advice after property damage has occurred. We can point out obvious things and refer to certain requirements, but implementation and how to do it needs to be left to those with that have competence on that. I think [for the insurance company] the key is that you understand or are able to detect the risk of recurring damages. That means we need to start with understanding what has happened, and why (...)."

3. Discussion

The chapters above have reported from two different but to some degree supplementary investigations. While the first have provided an overview of opinions and attitudes in the population, the second have given an in-depth understanding of insurance clients from the point of view of claim handlers, appraisals and sellers and how the insurance industry in general deal with climate related damages. In this section we will make connections between these studies and based on this point at some critical challenges ahead to build up better climate mitigation systems among property owners in Norway.

3.1 Responsibilities and incentives for implementing mitigation measures

A vast majority of the respondents in the survey believe that government efforts to prepare the Norwegian society for the consequences of climate change should increase, even if this means less funding for other areas. 9 out of 10 think that the central government is responsible for the climate change adaptation work, while far fewer think municipalities, private businesses, and households are responsible. The actual responsibilities are shared between several actors - the authorities (the municipalities in particular), private businesses, households, and volunteer organizations. Several of these responsibilities - including their own liabilities - are thus underestimated by a significant proportion of the respondents. In particular older people and those with lower income tend to overestimate the responsibility of the state. This might indicate a lack of clarity in the division of responsibilities, or that people believe that the central government should take more of the responsibility than they do today. Nevertheless, a large majority agree that they can take own measures to protect their own property. This indicates that many households might be willing to act if they believe it is necessary. Because heavier rainfall and floods are some of the most likely events for Norway, private property measures to avoid urban runoff are of particular importance.

The impressions of the insurance interviewees, however, were that awareness of connections between climate change and climate risk is limited at best among private property owners, which further implies a low chance of anyone being convinced that mitigation measures are necessary. Indeed, there seems to be little private action being

taken in terms of climate risk mitigation measures (at least related to FUR). Seen in relation to the stated willingness of a majority to implement measures to protect their homes, this indicates a need to look at structural issues related to insurance and risk mitigation. The relative absence of individualised insurance gives few incentives for customers to implement measures, and a flat premium no matter what risk mitigation measures may have been implemented can actively disincentivise measures. Yet as the interviews indicate, there are significant barriers to individualisation in the increased bureaucracy and workload this leads to. Indeed, individualisation and data gathering by the insurance companies on the state of private properties seems to have decreased significantly in the last few years, to cut operating costs. An increasing concern in the population for climate change and extreme weather, in particular among younger people, may spur a further interest to implement mitigation measures.

3.2 Knowledge and guidance to take actions.

Adaptation to climate change requires moving beyond "reactive" approaches. Proactive adaptation enables larger benefits than reactive adaptation, as both the avoidance of losses and the exploitation of opportunities are more effective (Perrels et al. 2022). Preventive action from all parts of society is thus vital. However, previous research on climate adaptation has shown that implementing preventative strategies is difficult in general, as even at a government central and municipal level, it has so far been much more common to repair issues after they occur (Riksrevisjonen 2022), and more extensive municipal efforts are generally spurred on after a local damage incident has occurred (Rusdal and Aall 2019) or awareness of a particular type of issue may be raised only after a national level event with major damages has occurred (Vindegg et al. 2022). In this respect, the Norwegian response to climate change has so far been characterised by a strategy that leads to being "sorry rather than safe", to invert a saying. State actors at all levels have much work left to improve risk mitigation work.

Further, within this context of lacking state efforts, relatively little attention has been paid to the responsibilities of private households and businesses, and the findings from the surveys and interviews suggest that more knowledge is needed. Few private property owners have the knowledge necessary to implement measures themselves and quality sources on possible measures are not always easy to share with laypeople (e.g. by appraisers). Insurance companies already inform their customers to some extent about climate risk, but currently the insurance companies' role seems to be passive rather than an active, in the sense that customers are given information on demand and not as a part of regular customer contact. Moreover, insurance company employees find themselves having to be careful about giving specific advice about mitigation measures to avoid liability, either in terms of costs or angry customers.

The state, national bodies, housing associations, builders, developers, architects, homeowners' associations and so on, could take more responsibility to inform their inhabitants, members and customers about specific responsibilities and recommend actions to prevent or limit the damage of climate change. Moreover, the interviews indicate that a view from the insurance industry is that media attention is a key factor in creating more awareness. However, insurance companies in Norway have yet to concretely adjust private property insurance to incorporate issues of FUR (beyond outlining possible ways it might impact damage totals on an aggregate level), not in financial incentives nor customer communication. The stated (theoretical) willingness of

most private property owners to implement their own measures is promising, yet the limited measures implemented so far implies that customers in general need insurance companies to take a more active role in motivating them to convert the willingness into practical measures.

3.3 Balancing individualization and perceived fairness

The survey indicates that on an aggregate level, that younger, wealthier and more highly educated private property owners would be the most likely to implement preventative measures. This also goes for people living in risk exposed areas in the south and west of Norway. One suggestion may be to start with such owners, not least because they are also likely to have properties of relatively high value, which from an economic standpoint can more easily justify costs of implementing risk mitigation measures. On the other hand, on a broader societal level, it is crucial to avoid an incentive system that starts with, and indirectly favours, those who are already in a socioeconomically strong position. If premiums and deductibles go up because of increased climate risk, people electing to not insure their properties may become a growing issue, which again may cause a downward spiral as they are faced with increased climate risk with less protection. The current organisation, averaging out of private property insurance through relatively flat rates was mentioned by several interviewees as beneficial precisely for the fact that it does spread out the financial costs of insurance in ways that protects more vulnerable groups. As indicated in the survey that expectations are to be covered by such agreements was higher in certain socio demographic groups, such as low-income household and older. This will be important to try and maintain going forward, to avoid people falling out of coverage due to raised costs. A restructuring of private property insurance towards more individualised premiums and coverage may be necessary to motivate customers to do their own measures, provided they also receive more actionable information and contacts through which to implement technically sound measures, but such a transition must also keep an eye out for the social transitional risks this may cause. It is also the case that insurance companies today enjoy a high level of trust in the population. Future incentive systems should be designed and promoted so that this is not jeopardized.

Referanser

- Aamaas, Borgar et al. 2018. "Oppdatering av kunnskap om konsekvenser av klimaendringer i Norge." CICERO reports 2018: 14.
- Aasen, Marianne, Marit Klemetsen, and Arild Vatn. 2022. "Folk og klima: utvikling i nordmenns oppfatninger om klimaendringer, klimapolitikk og eget ansvar 2018-2021." CICERO reports 2022: 07.
- Alnes, Kristina et al. 2018. "Flomrisiko i Norge: Hvem betaler for framtidens våtere klima?" CICERO reports 2018: 06.
- Civil Protection Act. 2010. "Lov om kommunal beredskapsplikt, sivile beskyttelsestiltak og sivilforsvaret (Sivilbeskyttelsesloven)."
- Dannevig, Halvor, and Carlo Aall. 2015. "The Regional Level as Boundary Organization? An Analysis of Climate Change Adaptation Governance in Norway." Environmental Science & Policy 54: 168-75.
- Hanssen-Bauer, I. et al. 2015. "Klima i Norge 2100." Norsk klimaservicesenter Report 2/2015.
- Hellevik, Ottar. 2020. "Ja-siing som problem i intervjuundersøkelser." Tidsskrift for samfunnsforskning 61: 255-70.
- If. 2020. "Ekstremværrapporten 2020 - Hvor godt klimatilpasset er norske kommuner."
- Klemetsen, Marit, and Miriam Stackpole Dahl. 2020. "Hvor godt er norske kommuner rustet for klimaendringer? Spørreundersøkelse om klimatilpassing våren 2020." CICERO reports 2020: 05.
- Ministry of Agriculture and Food. 2022. "Naturskade - Regjeringen."
- Ministry of Climate and Environment. 2013. "Meld. St. 33 (2012-2013): Klimatilpassing i Norge."
- Ministry of Justice and Public Security. 1990. "Lov om naturskadeforsikring." <https://lovdata.no/dokument/NL/lov/1989-06-16-70>.
- Ministry of Local Government and Regional Development. 2018. "Statlige planretningslinjer for klima- og energiplanlegging og klimatilpassing."
- Norwegian Environment Agency. 2022. "Ansvar for klimatilpassing - Miljødirektoratet." <https://www.miljodirektoratet.no/ansvarsomrader/klima/for-myndigheter/klimatilpassing/veiledning-til-statlige-planretningslinjer-for-klimatilpassing/ansvar-for-klimatilpassing/>.
- Perrels, Adriaan et al. 2022. "Proactive Adaptation to Climate Change Creates More Benefits than Reactive Adaptation." KUITTI Publication series of the Government's analysis, assessment and research activities. Policy brief 2022:16.
- Riksrevisjonen. "Riksrevisjonens undersøkelse av myndighetenes arbeid med å tilpasse infrastruktur og bebyggelse til et klima i endring." Dokument 3:6, 2022. <https://www.riksrevisjonen.no/globalassets/rapporter/no-2021-2022/dokument-3-6-2021-2022-undersokelse-av-myndighetenes-arbeid-med-klimatilpassing-av-bebyggelse-og-infrastruktur.pdf>.

- Rusdal, Tone, and Carlo Aall. "Kartlegging av erfaringer fra arbeidet med klimatilpasning i små og mellomstore kommuner." Vestlandsforskningsrapport, 2019. Selseng, Torbjørn, Marit Klemetsen, and Tone Rusdal. 2021. "Adaptation Confusion? A Longitudinal Examination of the Concept 'Climate Change Adaptation' in Norwegian Municipal Surveys." *Weather, Climate, and Society* 13(3): 633-48.
- Skogvang, Berit Johanne, and Tara Botnen Holm. 2022. "Klimamonitor Året 2021." Vestlandsforskning report 1/2022.
- Statistics Norway. 2022. "11536_ Annual Earnings, by Sector 2015 - 2021." <https://www.ssb.no/en/statbank/table/11536>.
- TEK17. 2022. "Byggteknisk Forskrift (TEK17) - Direktoratet for Byggkvalitet." <https://dibk.no/regelverk/byggteknisk-forskrift-tek17/>.
- Vindegg, Mikkel et al. 2022. "Barrierer for klimatilpasning på lokalt og regionalt nivå." *CICERO reports 2022*: 03.
- Yin, R. 2003. *Case Study Research. Design and Methods* (Third ed. Vol. 5). California, Thousand Oaks: Sage.

Appendix

Table 2: Results from regression analysis (The Norwegian Citizen Panel)

Response variable	(1) Willingness to take own measures Est. (std. err.)	(2) Household responsibility Est. (std. err.)
Age: Under 30	0.28 (0.22)	0.19 (0.23)
Age: 40-50	0.19 (0.18)	0.10 (0.19)
Age: 50-60	0.37** (0.17)	-0.20 (0.18)
Age: 60-70	0.37** (0.17)	-0.39** (0.18)
Age: Over 70	0.42** (0.18)	-0.25 (0.19)
Gender: Female	0.23*** (0.09)	0.54*** (0.11)
Annual income before tax: 300 001 - 500 000 NOK	0.18 (0.14)	0.27* (.15)
Annual income before tax: 500 001 - 700 000 NOK	0.25* (0.15)	0.38** (0.17)
Annual income before tax: 700 001 - 1 mill. NOK	0.61*** (0.19)	0.60*** (0.20)
Annual income before tax: Over 1 mill. NOK	0.60*** (0.23)	0.98*** (0.26)
Region: East (excluding Oslo)	0.17 (0.14)	-0.13 (0.14)
Region: South	0.57*** (0.21)	0.17 (0.26)
Region: West	0.29** (0.14)	-0.13 (0.15)
Region: Trøndelag	-0.14 (0.18)	-0.37* (0.21)
Region: North	0.22 (0.19)	0.19 (0.20)
Education: Upper secondary	0.16 (0.20)	0.39 (0.25)
Education: Higher	0.21 (0.20)	0.57** (0.25)
Model	STATA routine logit	STATA routine logit
Number of observations	1,891	1,905

Note: ***p < 0.01, **p < 0.05 and *p < 0.1. Robust standard errors in parentheses. Model 1: The response variable is ordered from 1-7 (7 = 'strongly agree'). Model 2: The response variable is binary (0,1), and equal to 1 if the respondent believes the household is a responsible actor. We use the STATA routine ologit where we have an ordered response variable (model 1), and logit when we have a binary response variable (model 2). The reference group: men between 30-40 years old, in Oslo, with low income (under 300 000 NOK) and compulsory school as the highest completed education. Source: The Norwegian Citizen Panel

Table 3: Results from regression analysis (CICERO's climate survey)

Response variable	(3) Climate concern Est. (std. err.)	(4) Climate concern Est. (std. err.)
Age: 30-44	-0.40*** (0.10)	-0.40*** (0.10)
Age: 45-60	-0.78*** (0.11)	-0.77*** (0.11)
Age: Over 60	-0.30*** (0.09)	-0.42*** (0.10)
Region: East (excl. Oslo)	-0.42*** (0.09)	-0.29*** (0.10)
Region: West and south	-0.30*** (0.08)	-0.15* (0.09)
Region: North and Trøndelag	-0.30*** (0.09)	-0.29 (0.10)
Gender: Female	0.51*** (0.06)	0.50*** (0.06)
Annual income before tax: 300 000 - 499 999 NOK	-0.41*** (0.09)	-0.41*** (0.09)
Annual income before tax: 500 000 - 699 999 NOK	-0.37*** (0.10)	-0.37*** (0.10)
Annual income before tax: 700 000 - 1 mill. NOK	-0.51*** (0.12)	-0.52*** (0.12)
Annual income before tax: Over 1 mill. NOK	-0.74*** (0.17)	-0.75*** (0.18)
Education: Upper secondary	0.32** (0.13)	0.30** (0.13)
Education: Vocational	0.11 (0.12)	0.12 (0.12)
Education: Higher (≤ 4 years)	0.66*** (0.12)	0.63*** (0.12)
Education: Higher (> 4 years)	1.13*** (0.13)	1.09*** (0.13)
Centrality index	omitted	0.001*** (0.0003)
Number of observations	4217	4208

Note: ***p < 0.01, **p < 0.05 and *p < 0.1. Robust standard errors in parentheses. The response variable is ordered from 1-4 (4 = 'very concerned'). Model 3 and 4 are identical, except model 4 also includes the variable "centrality index" (from Statistics Norway, describing each municipalities' proximity to goods and services). We use the STATA routine ologit. The reference group: men under 30 years old, in Oslo with low income (under 300 000 NOK), and compulsory school as the highest completed education. Source: ACT.

CICERO is Norway's foremost institute for interdisciplinary climate research. We help to solve the climate problem and strengthen international climate cooperation by predicting and responding to society's climate challenges through research and dissemination of a high international standard.

CICERO has garnered attention for its research on the effects of manmade emissions on the climate, society's response to climate change, and the formulation of international agreements. We have played an active role in the IPCC since 1995 and thirteen of our scientists contributed the IPCC's Sixth Assessment Report.

CICERO was founded by Prime Minister Syse in 1990 after initiative from his predecessor, Gro Harlem Brundtland. CICERO's Director is Kristin Halvorsen, former Finance Minister (2005–2009) and Education Minister (2009–2013). Jens Ulltveit-Moe, CEO of the industrial investment company UMOE is the chair of CICERO's Board of Directors. We are located in the Oslo Science Park, adjacent to the campus of the University of Oslo.