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Adaptation Attitudes Are Guided by "Lived Experience" Rather than Electoral Interests: Evidence from a Survey Experiment in Bangladesh

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Abstract: After decades of presuming that climate adaptation is a private good benefitting only those receiving resources to reduce individual climate risks, respondents in a survey experiment among the climate-vulnerable in Bangladesh chose less-particularistic adaptation projects than "electoral connection" disaster relief theories predict and more "short-sighted" projects than international diplomats anticipate. This article reports on the experiment, which asked a representative national sample of Bangladeshis whether they favor spending funds on short-term particularistic solutions (disaster relief stockpiles), medium-term inclusionary and non-excludable solutions (ocean embankments), or long-term, public goods solutions (the development of flood-resistant rice seeds). More respondents chose "middle ground" embankment spending, and a statistically significant change in respondent propensities was tied to their lived experience with climate vulnerability rather than electoral incentives. The logic of their choices contradicts existing explanations, implying that a reconsideration of vulnerable community preferences, and how to address them, may be needed.

Keywords: adaptation; climate adaptation; local climate policy; disaster preparedness; Bangladesh; climate policy stringency; resilience; vulnerability; survey experiment; development assistance; particularistic goods; public goods; electoral incentives in climate change

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1. Introduction

Climate mitigation (encompassing measures taken to diminish greenhouse gas emissions) has been advocated as a solution to "slow harms", given that mitigation measures in one country diminish greenhouse gas emissions all over the world. Hence, these measures qualify as public goods (or at least non-excludable goods), which improve the world's overall welfare. Projects promoting communities' adaptation to climate change, contrarily, have not been perceived as public goods (Dolsak and Prakash [1], Pielke et al. [2]).

Adaptation is the routinization of climate change effects; that is, their acceptance and accommodation into peoples' daily lives. The IPCC (2007, 9) defines adaptation as "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". This contrasts with mitigation, which the IPCC (2007, 9) defines as "an anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks". While means have still not been found to readily measure adaptation, mitigation has been boiled down to the second part of the definition, GHG emissions and sinks, so that it can be readily measured. However, this article argues that the public goods argument, while convincingly explaining the failure to reach an international agreement on limiting emissions for a

decade prior to 2015 and the lack of ambition in implementing the Paris Agreement, does not fully explain the domestic politics of adaptation projects. Based on a survey experiment in Bangladesh, we argue against this public goods argument, under which citizens would favor the provision of non-excludable projects that benefit the vast majority of citizens rather than particularistic projects benefitting few. Instead, we present evidence of vulnerable citizens' preferences for adaptation projects that fall midway between public goods seeking and particularistic; we call this middle category "inclusionary but particularistic".

Mitigation may only reduce greenhouse gas emissions one smokestack factory or one fossil fuel-heated household at a time, but any emissions reductions count as fungible worldwide savings, and thus they are absolute public goods and help countermand the tragedy of the commons and the "public bad" that emissions represent. Contrarily, adaptation efforts solve mostly local problems and hence are not usually considered public goods. Moreover, adaptation projects are often sourced with national—and international --funds. So, the fact that adaptation efforts are not global public goods may hinder how well they are resourced. But a survey experiment conducted in Bangladesh with over 3000 respondents indicates that the climate-vulnerable prefer an intermediate good (less particularistic than another option and less public than a third option), indicating that the binary categories of particularistic versus public goods usually used to analyze adaptation and mitigation projects may not be the most realistic way to think about the provision of adaptation.

Adaptation may be a response to a "public bad" (for example, extreme weather events exacerbated or caused by climate change), but some analysts view it as a private good (Sovacool and Linner [3], pages 14–15). Adaptation spending by wealthy nations on their own preservation may merely reiterate and deepen the North–South divide rather than provide for a broader common good. The famous Dutch dikes that help The Netherlands adapt do not benefit the drowning Pacific islands of Kiribati or Tuvalu, whereas the emissions-reducing effect of substituting all coal-powered plants with solar energy would mitigate climate change markedly over time and hence benefit everyone. Even within nations, adaptation through the construction of water embankments in the southern delta of Bangladesh does not help to mitigate climate-caused droughts in the northern Himalayan foothills. After briefly considering the international community's almost exclusive focus on mitigation, with about 90 percent of spending directed toward mitigation rather than adaptation worldwide since 2009, this article provides evidence of the preference for support focused on adaptation among climate-vulnerable, lower-income people. Adaptation support is preferred not only over mitigation but also over more general assistance for improving individual incomes.

Using data from a 2019 representative nationwide survey conducted in Bangladesh, among the most climate-vulnerable populations in the world, according to Germanwatch, we conducted a survey experiment to understand the preferences for longer- term versus shorter- term adaptation policies. Bangladesh, with 165.6 million people, ranked seventh among the world's top 10 countries most affected by extreme weather events over the last 20 years, according to Global Climate Risk Index 2019. An average of 679 people died in each of the 185 climatic events in Bangladesh occurring between 1996 and 2015, and the events led to a loss of nearly one percent in GDP per year on average (Kreft et al., 2016 [4]). In 2019, weather hazards caused the highest disaster displacement figures globally. Bangladesh was second highest in rank out of 10 countries, with 1,671,000 displacements due to weather-related disasters (UNDP, 2017), This survey was conducted on some 3494 adult respondents in Bangladesh between 26 June and 3 September 2019 to assess their views on climate change. The margin of error was three percent, and the response rate was 80 percent (see the Methodology Appendix in Section 9). This survey experiment asked people whether they favor spending funds on a short-term, particularistic solution (more disaster relief); a medium-term, inclusionary but particularistic solution (ocean embankments); or a long-term, public goods solution (the development of flood-resistant rice seeds). We consider the results in relation to theories on temporality and public versus private goods provision.

Focus group interviews with migrants in Dhaka's slums who had arrived there after infamous floods in the Borisal coastal floodplain over 30 years ago, raised questions about government transparency, effectiveness, and electoral interests that prompted further consideration of whether government adaptation measures were a public good. Several argued that the government was corrupt in their distribution of disaster assistance in recurring floods.

Indeed, far from Dhaka, in the Kutubdia Upazila, site of many coastal floods, local officials acknowledged skimming some 30 percent of funds from the Dhaka-based Water Development Board (WDB) but said this was a standard business practice and that they did not understand why local flood plain residents were upset. "Engineers and contractors are controlled by this central government agency (the WDB). The local people are very dissatisfied with the quality of construction works of these dams and embankments and they blame the central government agencies for the corruption and misuse of resources" (Haque, Fazlul interview). Others in this coastal flood area argued that resources were simply inadequate, as "relief centers were quite far away and we have to catch a long queue before getting the relief, so I did not go for collecting the emergency relief (Eisenstadt et al. [5], page 17)". Still others argued that the government ignored vulnerable citizens between floods ("the government just forgets us in times of normal periods") and adhered to self-interested electoral timing. "Does the government really care about us?", asked one climate migrant in Dhaka's Korail slum: "They only visit us during the election period (Eisenstadt et al. [5], pages 18–19)".

Our survey experiment results are suggestive more than conclusive, but we argue that they introduce the need for a more nuanced consideration of climate adaptation projects for the most vulnerable. They are the most numerous and important beneficiaries of these programs, but they are also those whose preferences are rarely recorded in any systematic way. In the sections that follow, we establish the logic of our case selection and the conduct of our survey in Bangladesh, discuss the findings of our survey experiment, and draw preliminary conclusions. But first, in the section that follows, we introduce a political economy theory addressing what we argue to be the public goods nature of adaptation.

2. Existing Literature: The "Temporality" and "Public Goods" Logics of Adaptation

Nordhaus (Ref. [6], page 320) wrote that, "A cooperative agreement [mostly on mitigation]. . . would be highly beneficial in the long run. . . However, this is an investment with a very long-term payoff. Most countries must wait at least a half a century to reap the fruits of their investment". Nordhaus refers here to the public goods nature of mitigation and to the long time-horizon needed for benefits of expenditures on mitigation to be evident. Since mitigation is a global public good, international diplomats and donors recognize the need for more than individual national policies and budgets to fix the problem. They do not feel such a compulsion to address adaptation, we argue, in part because adaptation is often associated with disaster relief. As shown by political scientists Healy and Malhotra [7], constituents reward public officials for disaster relief in the US (and Bangladeshi analysts we interviewed agreed), but they do not reward disaster preparedness spending, which is tantamount to adaptation projects, which involve planning and forethought.

The international community has been obstructed with regard to achieving progress in climate change mitigation by the long lag between action and benefit and by the fact that mitigation spending is a collective action problem wherein "free rider" nations can benefit from spending by the nations that expend resources to mitigate climate change. Progress on climate change adaptation has been obstructed by viewing adaptation through the "someone else's problem" dictum (Gardiner [8], page 84). This dilemma for adaptation also affects donor nations' adaptation spending, which, until recently, has been pledged in the form of altruistic donor assistance but largely **not** delivered to climate-vulnerable low-income nations with the greatest need, like Bangladesh (see, for example, Saunders [9] and Weikmans and Roberts [10]) (As of February 2019, a total of USD 320.17 million in funding was approved for climate financing for Bangladesh from international multilateral sources such as the Global Environment

Facility, Adaptation Fund, Green Climate Fund, and others excluding any bilateral sources (source: https://climatefundsupdate.org/data-dashboard/ accessed on 6 February 2019). Out of this USD 320.17 million, USD 214.16 was for adaptation, USD 62 was for mitigation, USD 2.3 was for reforestation (REDD, related to mitigation), and USD 40.97 was for mixed uses (both mitigation and adaptation).)

Even as adaptation funding has become more available in recent years and global imperatives have emerged for adaptation planning, it has not been clear to analysts "how national governments translate these global templates for subnational policy action, a critical issue for adaptation studies because adaptation is supposed to be a primarily local effort (Dolsak and Prakash [1], page 332)". Perhaps even more important than the local effort made by subnational officials to implement national policies and international priorities is whether vulnerable-area citizens, those who will have to follow government guidance, agree. Indeed, the climate-vulnerable in Bangladesh complain bitterly that government disaster relief—channeled through local governments—is inadequate and subject to corruption and that they are summarily ignored between natural disasters and elections (Eisenstadt et al. [5], pages 17–19).

In general, elected officials, such as local politicians, are said to obey a different set of incentives. In allocating disaster relief, as in other policy areas, Healy and Malhotra [7] argue that they follow the electoral cycle, perhaps most famously identified by Mayhew [11] as the "electoral connection", which dictates that politicians are interested in the short-term, particularly events occurring before their next election. Our evidence suggests that the climate-vulnerable in Bangladesh, where mitigation is a minor component of the policy agenda, feel ignored between elections and natural disasters. The vulnerable citizens we surveyed seek medium-term adaptation; that is, they do not favor the shorter-term time horizon of most politicians nor the long-term time horizon of most diplomats. As indicated in the survey experiment detailed below, they favor embankment construction, a middle-term and somewhat particularistic alternative to short-term and particularistic stockpiles of food aid provisions and to the long-term public good of research on developing flood-resistant rice strains.

Based on the literature on disaster relief as well as that on adaptation, we conclude that such a "middle ground" taken by the vulnerable represents an acceptance of extreme weather patterns that require not only disaster relief at strategic moments but also visible resource allocation, as Potoski and Prakash [12] argue in their comparison of visible air pollution and less visible water pollution. Healy and Malhotra [7] show that in the US, voters reward incumbent presidents for disaster relief but not for disaster preparedness spending. While our climate-vulnerable sample in Bangladesh favors visible preparedness (embankments) over less-visible preparedness (research on floodproof rice strains), they do not take as strong an interest in the direct provision of extra disaster relief supplies. We speculate about the reasons for this in our conclusions but note that vulnerable Bangladeshis, because of their constant experience with natural disasters, may be less "myopic" (Healy and Mlhotra's term) with regard to these disasters than the Hurricane Katrina victims studied by Healy and Malhotra (Ref. [13], pages 402–403), despite having, we imagine, much lower levels of education.

3. Climate Change Vulnerability and Adaptation Assistance for the Vulnerable in Bangladesh

Some of the aforementioned theories consider legislator and politician preferences and how these might apply to climate adaptation, but we know nothing at all about what people on the ground actually want, as the literature does not specify this. We apply these theories imperfectly, as the Bangladeshi vulnerable prioritize relations with local politicians to a greater degree than those with national politicians, especially in relation to disaster relief related to adaptation, which is arguably the most important issue in many of our respondents' lives. Bangladesh's climate vulnerability is due to its low-lying terrain and susceptibility to cyclones, coastal storm sea-level surges, river flooding, and droughts. Its

climate-sensitive sectors, such as agriculture, comprise over 20 percent of the country's GDP, even as the nation has sought to diversify its economy. During this country's monsoon season, around 80 percent of its land is flooded. The Bangladeshi government estimates that floods in 2007 caused damage amounting to over USD 1 billion and that the nation is already losing 1.8 percent of its GDP (which totaled about USD 220 billion in 2016) yearly due to climate change (Gudmundsson et al. [14]). Dasgupta et al. 2014 (Ref. [15], page 104) estimated the cost of adaptation to cyclones and associated storm surges in coastal areas of the country to be about USD 2.4 billion.

Because most of the country is less than 12 m above sea level (Nishat et al. [16]), its land areas are vulnerable to salinization and sea-level rise. Soil salinity causes agricultural losses, compromising food security and agricultural livelihoods for lower-income households. Rising water salinity jeopardizes drinking water supplies and causes diseases (Khan et al. [17]). Studies of coastal Bangladesh show the limits of adaptation. For example, households in this region lost USD 1.9 million in the three years after Cyclone Aila in 2009, even though farmers had already implemented adaptation strategies, such as planting saline-tolerant rice varieties (Rabbani et al. [18]). Indeed, estimates predict that in areas with the greatest salinity increases, rice yields will decline by over 15 percent by 2050 (Dasgupta et al. [19]).

Sea level rise and salinization also are forcing people to relocate (Nishat et al. [20]). To Siddiqui (Ref. [21], page 6), "migration is considered as a livelihood strategy for both the poor and better-off". To Dasgupta et al. [22], migration seems to be the "only feasible form of disaster insurance for coastal households". Strategies vary according to socioeconomic status and pre-established migrant networks. Rural coastal farmers and fishers tend to move to nearby cities, where they take on day labor differing from their former livelihoods (Ahsan et al. [23], pages 302–305). Migrants often hurriedly abandon their land and prioritize low-priced housing at their destinations, creating new urban slums and resulting safety and health hazards (Ahsan et al. [23], page 305). While these climate change dynamics in Bangladesh's coastal south may be the most severe, the nation has also suffered from freshwater flooding from Himalayan ice melt and monsoons in the north and droughts in some isolated and elevated areas.

Based in part on the frequency and severity of cyclones and floods, the Bangladeshi government has undertaken more climate adaptation projects than most nations, having initiated domestic infrastructure improvements to prevent flooding by inaugurating the all-important Bangladesh Water Development Board the year it declared independence in 1972, while many nations reliant on international donors are still waiting to implement risk-reducing infrastructure improvements. The Bangladesh Climate Change Strategy and Action Plan was launched in 2009 to capture some of the international funding and develop the capacity to steward domestic funds. The plan identified six areas of climate finance focus: (1) food security, social protection, and health; (2) comprehensive disaster management; (3) infrastructure; (4) research and knowledge management; (5) mitigation and low-carbon development; and (6) capacity building and institutional strengthening. To implement the Strategy and Plan, two entities were established that have administered the lion's share of Bangladesh's climate finance funds. These are the domestically managed Bangladesh Climate Change Trust Fund (BCCTF), which has spent nearly BDT 390 million over seven years, and the World-Bank-managed Bangladesh Climate Change Resilience Fund (BCCRF), which is still being constituted and has disbursed about BDT 75 million so far.

Bangladesh receives combined climate financial aid from international donors with internal funding to activate the BCCTF, which has maintained an extensive presence in terms of "hard adaptation" throughout Bangladesh. Between July 2009 and June 2019, a total of 687 projects under BCCTF were approved, 624 of which are being implemented by the government Ministries/Divisions directly, while the remaining 63 projects are being implemented by different NGOs under the supervision of the Palli Karma Sahayak Foundation (PKSF). For these 687 projects, the total sum of money allocated for spending amounts to approximately USD 376 million. There is some evidence regarding "climate corruption" in some Bangladeshi activities to mitigate impacts of climate change. For

this reason, our survey included questions to elicit the respondents' perceptions of the effectiveness of climate finance implementation. Overall, the respondents claimed that such projects were implemented more effectively than basic services (which 15 percent of the respondents rated as ineffective or highly ineffective). Some 23 percent rated disaster relief as ineffective or highly ineffective, while some 20 percent rated infrastructure for protecting people from natural disasters as ineffective or highly ineffective. The respondents did have first-hand experience with these programs; while only 12 percent had received disaster relief in the last five years, some 73 percent knew of disaster prevention infrastructure (cyclone shelters and ocean and river embankments) being constructed near them.

4. Surveying Climate Vulnerability among Low-Income People in Bangladesh

To assess what affected individuals want in terms of adaptation assistance, we recruited a representative sample of Bangladeshis to complete a face-to-face public opinion survey. Our primary sampling units (PSUs) for this survey were rural Union Councils (4553), suburban Municipalities (323), and City Corporations (11). Both the suburban Municipalities and City Corporations are part of urban representation in this survey. There are fewer urban PSUs, as the urban population size is lower than the rural one. However, climate change will have greater effects on people living in rural as opposed to urban areas of Bangladesh. As further elaborated in the Methodology Appendix in Section 9, we oversampled in vulnerable areas and in areas with large numbers of climate projects.

Our secondary sampling units (SSUs) were rural villages and suburban and urban wards. Our tertiary sampling units (TSUs) were family households. The last stage of sampling the respondents relied on the classic Kish-table for within-household selection. All selections of PSUs and SSUs followed the probability-proportional-to-size (PPS) mechanism, using census information on PSU and SSU sizes. TSU selection followed a systematic sampling mechanism using selected village and ward lists of registered households.

Ultimately, we interviewed 3494 respondents between 26 June and 3 September 2019. The sample was intended to be nationally representative, and according to the most recent available census figures, this goal was largely met, given some allowance for the novelty of the setting and standard issues regarding survey responses (Our reference data for conclusions about the representation of the sample come from Bangladesh Statistics 2018, published by the Bangladesh Bureau of Statistics, Statistics and Information Division, Ministry of Planning. At present, the official unemployment rate of Bangladesh is 4.2 percent, which is not a representation of the on-the-ground reality. The Labour Force Survey (LFS) 2016–2017 of the Bangladesh Bureau of Statistics (BBS) reveals that while the national unemployment rate is 4.2 percent, the youth unemployment rate is as high as 10.6 percent. The share of unemployed youth in regard to total unemployment is 79.6 percent (CPD:2018). The quantity of survey data for the unemployed (28.2 percent) is much higher, and there are some practical reasons for this. Part of the explanation may be that our oversample was in rural areas, where unemployment is higher. See the Methodology Appendix in Section 9 for further details). Our survey respondents tended to be older than average (with a median age of 38 versus 27 in the population) and were more likely to be unemployed (28% in the survey versus a 4.2% unemployment rate in the population, though some of this discrepancy could be measurement-related, and Bangladesh's actual unemployment rate is likely much higher than statistics indicate). The samples are reasonably well matched in terms of urban/rural split, religion, and gender and differ from national samples only with regard to levels of employment (Usually, in a survey conducted in Bangladesh, if the respondents include people not actively looking for jobs (discouraged workers), people who are homemakers (most of the women in Bangladesh), and people who are involved in the informal sector and work for a very limited time and if they are asked an "are you employed" kind of a question to identify unemployment, it is expected that many negative responses will be received, leading to a high unemployment rate. All these categories are not considered when estimating the official unemployment rate).

This study looks at Bangladeshi residents' perceptions of the problems posed by climate change, their political and social trust, migratory plans, and behaviors linked to climate financing. Data were gathered using a multi-stage stratified-sampling technique with probability proportional to size (PPS). The sample frame employed was the Integrated Multi-Purpose Sampling Frame (IMPS). The estimated sample size of the national survey is around 3334, with a margin of error at 3 percent, a design effect of 2.5, and a response rate of 80 percent.

Based on where projects linked to climate change and climate vulnerability were being undertaken, 64 districts were categorized. Sub-districts (SSUs) and household segments (TSUs) were chosen after Primary Sampling Units (PSUs). Additionally, one adult was randomly chosen for in-person interviews from each family included in the study.

The survey questionnaire was translated from English to Bangla to make the questions understandable to the respondents. Moreover, we recruited local enumerators who spoke in local dialects and asked them to speak in that dialect and describe the questions to the survey participants. As a result, the respondents could easily understand the questions.

Appendix A lists the descriptive variables from the survey used in this paper. The data from the survey can be accessed at https://doi.org/10.17606/eb9x-r743. Our survey prominently captured a range of vulnerability-related dynamics. Some 18 percent of the survey respondents had noticed changes in the seasons over the last five years, and some 46 percent had become personally ill or injured as a result of climate events, which included loss of cropland from sea level rise, crop failure, loss of cropland due to the salinity of non-coastal waters, cyclones (cyclones are the regional designation for the weather events elsewhere known as hurricanes), flooding (and/or landslides), drought, and heat waves. At least 10 percent of the respondents knew people affected by each of these climate events, with 33 percent knowing people who experienced crop failure, 31 percent knowing people who experienced drought, and 25 percent knowing people who experienced flooding. As a result of these natural events, some 12 percent of the respondents had to leave their homes temporarily.

5. Design of the Survey Experiment

We used survey experimentation to understand the citizen perceptions of the types of climate finance projects for reducing vulnerability and the extent to which the executing agency type (government versus NGOs) shaped the respondents' impressions of the projects. Using areas where extreme weather events have had recent impacts, we followed a classic 2×3 factorial design for the experiments embedded in our Bangladesh national survey. The first key variable is the nature of local projects funded by climate change funds, that is, short-term expenditures (disaster relief) and medium-term infrastructure projects (ocean and riverine embankments) versus other, longer-term programmatic efforts to foster resilience, such as modifying rice seed strains; and the second key variable is the nature of project managers, that is, government agencies vs. NGOs. The full design is described in Figure 2.

Wo co-authors held ten focus group sessions in August 2017, with the number of participants ranging from six to ten. Seven of these groups were conducted in climate-impacted areas from which people were likely to migrate: three were conducted in the drought-prone area of Mogulbasha Union in Kurigram district, and one each was conducted in the cyclone-prone areas in Kutubdia Upzilla and Pekua Union, both in Cox's Bazar. Two focus group sessions were held in a migrant-receiving area, Dhaka's Korail Slum. Additional focus group sessions with experts were held at North-South University and the Bangladesh Meteorological Department in Dhaka, and one was held with university students at North-South University (Eisenstadt et al. [5]).

While the less-educated respondents, constituting most of the survey and experimental sample, may not have ever heard of climate change, focus group testing showed us that they felt malaise due to extreme weather events and the vulnerability they bring, which exacerbates their poverty and prompts them to consider relocating, either temporarily or permanently. While understanding respondent perceptions of climate change and its causes and attributions is important, the main focus of this survey was to understand who the respondents think should be responsible for helping them solve these problems. Generally, adaptation finance projects are

well recognized by local people (mostly as infrastructure projects). Most of these projects can be broadly related to climate-related risks by local politicians and other decision makers. We want to determine Bangladeshi citizens' perceptions of the efficacy of groups who have tried to undertake climate-related projects, particularly regarding different layers of governments and non-government organizations. (A lack of sufficient knowledge or information is always a concern for survey research, especially among those with lower socioeconomic status. But this does not necessarily prevent people from forming opinions on related issues. One example obtained from a focus group on an island was an opinion stating that had the government given a particular construction job to the military rather than general contractors, the situation could have been much better.) We address these issues by separating treatment groups as described in what follows.

To offer at least a preliminary test regarding climate-vulnerable adaptation project preferences, one part of our survey was an experimentally varied vignette. This vignette referenced a (hypothetical) climate adaptation project and varied—at random—both the project itself and the actor in charge of carrying it out. The text of the vignette is depicted below, with the experimental variations given in parentheses:

> *"Your Upazila [locality] recently received a large sum of money from the central government for an area that was flooded last year. The money is sufficient for either developing new forms of water-resistant rice seeds or building new embankments or preparing relief materials for the next disaster, but only for one of these projects. Later, the government announced that it would use the money for [developing new forms of water-resistant rice seeds//building new embankments//preparing relief materials for the next disaster]. It also announced that [the government—rather than an NGO//an NGO—rather than the government] was going to administer the project".*

The randomization resulted in six approximately equally sized treatment groups, with group n ranging from a minimum of 432 to a maximum of 538. We assessed the balance of these treatment groups in terms of sociodemographic background characteristics (gender, age, literacy, formal education, employment status, number of family members in the household, marital status, number of children, and ownership of various household appliances and technologies) using a combination of independent-samples t-tests and chi-square tests. The results from these balance tests were generally satisfactory, and there appear to be no systematic imbalances poised to undermine what we report below. In total, we conducted 435 Chi-square tests and 435 *t*-tests; these numbers were determined by the total number of pairwise distinct comparisons across six treatment groups (15) multiplied by the number of sociodemographic background variables (29). Of these comparisons, only 23 (5%) yielded cross-treatment differences at a level better than $p = 0.05$, or, in other words, exactly what one would expect under randomization. Upon closer examination, none of these appeared to threaten the results we report. (For further material, please consult the authors.)

Immediately following the vignette, the respondents were asked two questions in sequence:

> "Do you think your Upazila made the right decision to use the money for [chosen program] rather than [not-chosen program A] or [not-chosen program B]?"
>
> "Does this project make you feel safer?"

For each question, the respondents could opt for a "Yes" or "No" option, with the former coded as "1" and the latter coded as "0".

It is worth noting that this design lacks a true "control" condition against which we might benchmark treatment effects. This was by design, as such a condition would require an essentially identical prompt without any mention of what the project is or who was to carry it out. The notion of eliciting a response to some hypothetical climate project that is both unspecified and not linked to an implementor struck us as rather dubious and likely to cause more interpretive difficulties than it solved.

Although our results are preliminary and suggestive only, we loosely set up the three responses as a test of one of the theories. A stockpile of disaster relief was the more

temporally proximate adaptation project and perhaps also one that politicians could find easier to deploy for clientelist purposes, although our survey responses confirmed that disaster relief is not a usual source of corruption in Bangladesh. The temporally intermediate source was the embankment project, and the long-term adaptation project consisted of developing water-resistant rice seeds. We claim that the embankments were selected because they solved individual problems, as did the disaster relief stockpile, but the embankments also reduced the secondary impacts of extreme weather events by helping to maintain the integrity of their families and communities. In other words, the embankments are seen as particularistic but also inclusive. We settle on the distinction between particularistic versus public goods as the optic through which we expect the vulnerable to have viewed the problem and emphasize that while international diplomats view adaptation as a particularistic problem from their "high altitude" assessment (comparing it to mitigation), local vulnerable communities view rice seed development as a public good, disaster relief stockpiles as a particularistic good, and embankment construction as the intermediate choice.

6. Results of the Survey Experiment

Turning to the results of the experiment, we note first that the respondents generally approved of the prompted choice across conditions, with 66 percent of all the respondents agreeing that it was the right decision and an identical proportion agreeing that they would feel safer as a result. Figure 1 (below) plots mean differences on the first dependent variable—whether the Upazila "made the right decision" according to treatment. 95 percent confidence intervals are provided around the point estimates. In terms of the choice of program, the respondents favored the embankment project over *both* relief and the development of water-resistant seeds, a difference that is statistically significant against the base category ($p < 0.001$) of whether the chosen implementor was governmental or an NGO. The obvious pattern is clear favorability for one particular policy end (of the three presented), without much regard for which institution is carrying out the providing.

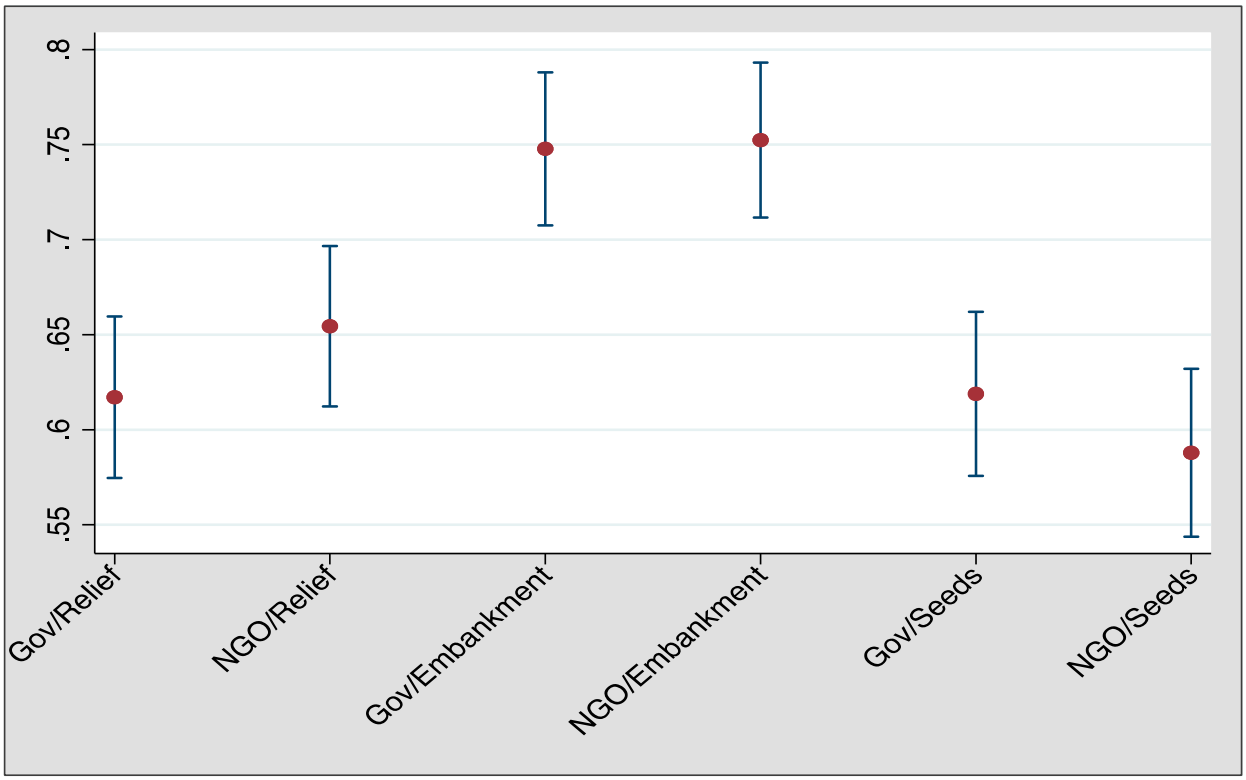

Figure 1. Did the Upazila make the right decision? Notes: Means are plotted according to condition with 95 percent confidence intervals. *Y*-axis is scored as follows: 0 = "No" and 1 = "Yes".

Figure 2 (below) shows a similar graph for the second dependent variable: whether respondents would feel "safer" as a result of the program. Virtually identical results were obtained; the respondents were far more likely to support an embankment project than either the organization of relief or a water-resistant seed project.

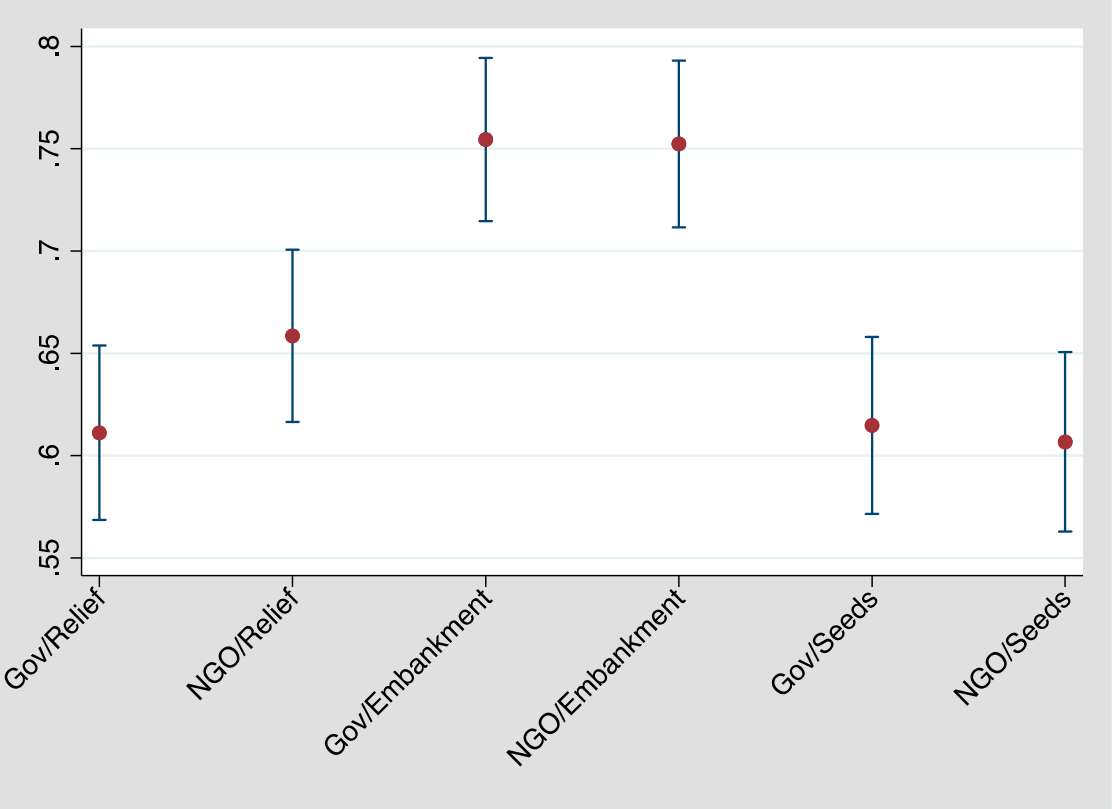

Figure 2. The Upazila's decision made people feel safer. Notes: Means are plotted according to condition with 95 percent confidence intervals. *Y*-axis is scored as follows: 0 = "No" and 1 = "Yes".

Given the strong tradition of social programs (including for disaster relief and adaptation) being provided by non-governmental organizations, including the BRAC, the largest NGO in the world, we also tested whether the implementer (whether the government or an NGO) affected the respondents' choice of adaptation project. We found that regardless of whether the government or NGOs were executing the projects, the respondents favored the inclusionary particularism of embankments over both the more particularistic option of disaster relief and the public goods option of rice seed development.

Our findings thus far indicate that respondents may seek projects that can improve their welfare in the medium-term and at an intermediate level on the public–particularistic continuum. But what of the most vulnerable of these respondents? Are respondents who feel more vulnerable to climate change more eager to undertake adaptation projects expeditiously, as Adger et al. [24] imply?

Further analysis of the survey data conveys that this is indeed the case. Table 1 below indicates that response to treatment depends on how vulnerable respondents are to a given climate threat. The more salient the threat, the weaker the preference for long-term, "soft adaptation" public goods, such as rice seeds, over the other two options. This is evidenced in two ways: first, by showing that *objective* climate vulnerability (as provided with data on the number of climate projects undertaken by the BCCTF per Upsala census unit) moderates responses to the experiments, and second, by showing that *subjective* experience of flooding (asked in the survey) moderates responses to the experiments. In Table 1, we report three models. The first includes treatment interactions according to reported experiences of increases in

flooding (which were reported in the survey), while the second includes treatment interactions according to district-level vulnerability, and the third includes both.

Table 1. Project vulnerability as a function of respondent exposure to flooding.

	(1)	(2)	(3)
	Project Favorability	**Project Favorability**	**Project Favorability**
Subjective Experience of Flooding	0.00	0.03	0.02
(Dataset Survey Variable D2)	(0.01)	(0.02)	(0.02)
Scored from 1 = Much Less Flooding to 6 = Much More Flooding			
Objective District Vulnerability	−0.02	0.03	−0.01
(Dataset Variable: Vulner2)	(0.06)	(0.04)	(0.06)
Scored from 1 = Most vulnerable to 4 = Least vulnerable			
Treatment: Relief/NGO	−0.06	0.09	−0.00
	(0.06)	(0.06)	(0.09)
Treatment: Embankments/Government	0.01	0.16	0.03
	(0.10)	(0.08)	(0.13)
Treatment: Embankments/NGO	0.12	0.15 *	0.14
	(0.13)	(0.07)	(0.15)
Treatment: Seeds/Government	−0.25 *	0.15 **	−0.10
	(0.10)	(0.05)	(0.11)
Treatment: Seeds/NGO	−0.31 **	0.12	−0.17
	(0.10)	(0.06)	(0.09)
Treatment: Relief/NGO * Subjective Experience of Flooding	0.04		0.03
	(0.02)		(0.02)
Treatment: Embankments/Gov * Subjective Experience of Flooding	0.05		0.04
	(0.05)		(0.05)
Treatment: Embankments/NGO * Subjective Experience of Flooding	0.00		0.00
	(0.06)		(0.06)
Treatment: Seeds/NGO * Subjective Experience of Flooding	0.10 **		0.08 **
	(0.03)		(0.03)
Treatment: Seeds/NGO * Subjective Experience of Flooding	0.11 **		0.10 **
	(0.03)		(0.03)
Treatment: Relief/NGO * District Vulnerability		−0.02	−0.02
		(0.02)	(0.02)
Treatment: Embankments/Gov * District Vulnerability		−0.01	−0.00
		(0.02)	(0.03)
Treatment: Embankments/NGO * District Vulnerability		−0.01	−0.01
		(0.02)	(0.02)
Treatment: Seeds/NGO * District Vulnerability		−0.06 ***	−0.05 **
		(0.02)	(0.02)
Treatment: Seeds/NGO * District Vulnerability		−0.06 **	−0.05 **
		(0.02)	(0.01)

Table 1. *Cont.*

	(1)	(2)	(3)
	Project Favorability	**Project Favorability**	**Project Favorability**
_cons	0.66 ***	0.47 ***	0.60 **
	(0.15)	(0.12)	(0.16)
N	2831	2831	2831
R-sq	0.039	0.033	0.043
Standard errors in parentheses			
= * $p < 0.05$	** $p < 0.01$	*** $p < 0.001$"	

Each interaction should be interpreted as the extent to which a treatment matters differently (versus the baseline category "relief/Government") according to the extent to which people are vulnerable. Models I and III show that favorability for water-resistant seed development increases as one reports fewer experiences of flooding. (If this seems counter-intuitive, recall that these preferences are baselined against harder adaptations against flooding and not the absence of any adaptation project at all). By the same token, decreasing objective vulnerability based on objective spatial proximity to climate harm *increases* the preference for seed research (Models II and III). In either case, people experiencing less direct threats appear more willing to favor longer-term, more speculative projects.

7. Discussion of Findings

Fieldwork helped triangulate further evidence for our argument. A local government official from the flood-prone Khulna district provided the following observation:

> "[Availability of] Disaster relief is not a major concern to most citizens of Bangladesh. The number of hard-core poor has been reduced and government's social safety net programs have been expanded significantly over the last three decades. Vulnerable people are more concerned about the semi-permanent solutions of disasters such as building embankments and cyclone shelters" (Khatun, Shaila, personal communication, 23 April 2020).

Our results confirm this statement, as the survey respondents preferred the inclusionary and particularistic middle ground of embankments over the more particularistic disaster relief stockpile. More generally, our respondents chose less particularistic adaptation projects than "electoral connection" disaster relief theories predict and less long-term projects than international diplomats and some development experts advocate.

Upon taking these preliminary results into consideration, the electoral cycle short-term logic is no doubt exacerbated by climate change, which has long-term, rather than short-term, consequences. A range of reasons exist for why international diplomats and international organizations favor long-term projects to short-term ones. Long-term projects are considered more effective in solving problems more permanently. However, extending the work of disaster relief theorists like Healy and Malhotra [7], we present two other arguments based on political logic rather than project efficiency. First, in contrast to politicians worried about re-election, diplomatic bodies like the United Nations, seeking to avoid worrying short-term-oriented politicians, choose long-term time horizons, creating another gap between the intermediate time horizon of our respondents and the preferred time horizon of diplomats. A second possible explanation is based on clientelism research, which implies that local politicians also favor supporters with a non-programmatic distribution (see, for example, the work by Stokes et al. [25]). In Bangladesh, embankment construction has been a source of multiple corruption scandals, whereas disaster relief has been viewed by authorities as being "beyond political games" (Aminuzzaman [26]). Lastly, a goods-related explanation may be that respondents are also swayed by populism,

which, in some guises, implies that politicians may seek to construct visible displays of their success, such as large public works (Ascher [27]) like embankments.

8. Preliminary Conclusions and a New Means for Considering Adaptation Projects

Our results refute the temporality argument, as the most frequently selected adaptation project, embankments, was not the electoral business cycle short time-horizon, nor the "slow harms" long time-horizon. Still, the results were overdetermined, as we claim that the respondents chose embankments because they were at an intermediate level on the public goods-non-excludability continuum, whereas the selection of embankments also confirms the "hard adaptation" theory, although the respondents did not choose the most fungible "hard adaptation" benefit: a disaster relief stockpile. The respondents' selection of the intermediate choice of embankments reflects the choice of a middle ground between particularistic disaster relief stockpiles and public good rice seed development.

Perhaps more importantly, the longstanding "mitigation as public good/adaptation as private good" dichotomy needs to be reconsidered. From upper-floor United Nations conference rooms, adaptation projects may seem entirely particularistic. But even as UN reports praise the fact that 72 percent of nations had introduced national-level adaptation planning instruments (Rukikaire [28]), funding flows from developed nations to developing ones remain scant, and only three present of 1700 adaptation initiatives surveyed have reported reducing climate risks to date. Despite movement in the direction of mainstreaming adaptation into "public goods" development assistance, this promise has still not been delivered.

From the vantage of the most vulnerable, on the Bangladeshi coastline, at or below sea level, there are public goods adaptation policies (rice seed research), particularistic policies (disaster relief), and the middle ground, inclusionary and non-excludable goods (which seemingly protect individuals' immediate needs but also diminish their susceptibility to secondary effects from extreme weather events). Vulnerable citizen respondents in Bangladesh, while undoubtedly being less educated than Healy and Malhotra's [12] US-based "myopic voters", as 81 percent of the Healy and Malhotra sample claimed to be literate, may also have been less short-sighted, as they showed a preference for intermediate-term interests rather than just for short-term ones, even despite the widely publicized corruption of embankment construction projects. Our sample conveyed that coping with natural disasters was a routine part of their lives; the perils of adaptation were baked into their preferences, allowing them to see beyond the last disaster and make more objective choices than disaster policy scholars like Healy and Malhotra may have anticipated, even with all the flooding, loss of livelihood, and temporary and permanent migration they have experienced. Adaptation was a way of life rather than a response to exceptional events, meaning that temporality lost some of its salience in our respondents' identification of a preference in the experiment.

Our survey experiment did not allow us to draw definitive conclusions, as we are still unable to fully distinguish which argument—temporality and/or public goods—caused the respondents to favor embankments over food aid stockpiles or rice seed research. Further research is needed to definitively associate the results of our survey experiment with the causes we have identified. However, this article does make perhaps the first systematic effort to show the apparent disconnect between the international community, whose slow pace of change—but efforts toward public goods provision—might more closely approximate rice seed research, and local officials, who seemingly might favor a food aid stockpile, which might be more readily divvied up among partisans in a discretionary and particularistic manner, and before the next election. Disaster-seasoned vulnerable citizens, however, may pick the third, middle-ground choice of bolstering flood embankments, contrasting with the preferences of the other groups.

This article has shown that vulnerable people on the front lines of climate adaptation in Bangladesh do not choose only particularistic, short-term, and local solutions. Rather, they pay some attention to temporally and spatially distant concerns. These findings should be welcomed, as they imply that national and international policies for adaptation—as well as for mitigation—may be more readily accepted by climate-vulnerable populations than was previ-

ously thought. While this realization, i.e., that drivers of adaptation policy beyond localities should be considered, is important, the findings of this study, while novel, are still broad.

More research is needed to better understand this demand for policies on the ground, as the supply of policies by diplomats and government officials has been overstudied. The vulnerable themselves will increasingly be relied upon to implement policies (or at least follow them), and as climate change worsens, the scope of these policies will only increase. We know far too little about their reactions to the climate policies handed down in nations like Bangladesh, where climate adaptation will likely start to crowd out most other policies within a decade or two. We know even less about their aspirations and desires, which might help policymakers design policies that the climate vulnerable can more contentedly follow.

9. Methodology Appendix

Technical Notes for Survey Sampling

This study is based on a national representative sample of Bangladesh, aiming to understand Bangladeshi citizens' general perceptions of the threats from climate change and related issues, their political and social trust, and migratory intentions, as well as their experience with and perceptions of climate-finance-related activities. Multi-stage stratified sampling with probability proportional to size (PPS) was used for data collection.

The Integrated Multi-Purpose Sampling frame (IMPS) developed by the Bangladesh Bureau of Statistics (BBS) was used as a sampling frame. The estimated sample size of the national survey is around 3334, with a margin of error at 3 percent, a design effect of 2.5, and a response rate of 80 percent (both the design effect and response rate were identified using pertinent information from similar existing national representative surveys).

Detailed stratification and sampling strategies are summarized below:

First, 64 Bangladesh districts were stratified along two dimensions: (1) the level of climate vulnerability (based on the government report entitled *Bangladesh Delta Plan 2100* [29]) and (2) the number (both accomplished and ongoing) of climate-change-related projects (based on reports from the Bangladesh Climate Change Trust Fund (BCCTF) since 2010 [30]). Much of the demographic data comes from the Bangladesh Statistical Agency [31].

Considering the approved projects from the BCCTF, Patukhali was identified as a representative case of districts with high climate vulnerability and a large number of climate-change-related projects from BCCTF. Chandpur/Laximipur was identified as a representative case of districts with high climate vulnerability but a small number of climate-change-related projects. Mymensigh was identified as a representative case of districts with low climate vulnerability but a large number of climate-change-related projects. These three districts were assigned to Stratum11 for subsequent oversampling of respondents with varying experiences of extreme weather events and the performance of climate-change-related projects. The remaining 61 districts were assigned to Stratum12 for subsequent standard sampling of respondents.

The climate project and extreme weather oversample are as follows.

	Low Amount of Extreme Weather	High Amount Extreme Weather
Low N Climate Projects	No oversample	Chandpur/Laximipur
High N Climate Projects	Mymensigh	Patukhali

The Primary Sampling Units (PSUs) are districts. All three PSUs in Stratum 11 were selected. Meanwhile, 16 out of 61 PSUs were randomly selected from Stratum 12 using the PPS method. Altogether, 19 PSUs were selected.

Then, each selected PSU was further stratified into two sub-districts (i.e., Upazilla Parishads): one for urban areas and one for rural areas. This stratification was based on related information from the Bangladesh Bureau of Statistics. Altogether, 38 sub-districts were identified.

The Secondary Sampling Units (SSUs) are Union Parishads. Within each identified sub-district, SSUs were randomly selected using the PPS method. Altogether, 15 SSUs were selected from Stratum11, and 183 SSUs were selected from Stratum12.

The Tertiary Sampling Units (TSUs) are segments of 100 households (again, using related information from the Bangladesh Bureau of Statistics [29]). Within each selected SSU, two TSUs were randomly selected using the PPS method. Altogether, 30 TSUs were selected from Stratum11, and 366 TSUs were selected from Stratum12.

The Quaternary Sampling Units (QSUs) are households. In Stratum11, within each selected TSU, 40 households were randomly selected using the Systematic Random Sampling (SRS) method. In Stratum12, with each selected TSU, six households were randomly selected using the SRS method. Altogether, 1200 households were selected from Stratum11, and 2196 households were selected from Stratum12.

Last, we randomly selected one adult from each selected household for an interview, again using the SRS method. Overall, 3396 respondents were selected for tablet-based face-to-face interviews.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of American University, Washington DC (IRB-2018-19, 17 May 2017).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data from the survey (and the codebook) is available at the Amer-ican University Digital Research Archive, catalogued online (DOI 10.17606/eb9x-r743) as "Climate Change Attitudes in Bangladesh: Data from a 2019 National Survey".

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Appendix A. Survey Descriptive Variables Used in this Paper

Variable	Range	Mean	S.D.	n
Subjective Experience of Flooding	1–6	2.34	1.69	3441
Coding of District Vulnerability/Extreme Weather	1–4	2.57	1.31	3432
Female (Dummy)	0, 1	0.40	0.49	3441
Age in Years	23–96	40.6	13.1	3441
Able to Read and Write Well (Dummy)	0, 1	0.81	0.39	3441
Formal Education (from zero to post-high school)	0–4	2.53	1.25	2802
Unemployed (Dummy)	0, 1	0.28	0.45	3441
Possessions Index (items included washing machine, motorcycle, satellite dish, indoor plumbing)	0–3	1.44	0.88	3441
Non-Muslim (Dummy)	0, 1	0.09	0.29	3441
Number of Climate Projects in Census District	1–40	18.2	7.34	3433

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