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From valuation to action: Understanding the role of relational values in the willingness to contribute to conservation efforts. Evidence from a lab in the field experiment.

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List of Abbreviations

Adaptation Initiative for Climate Vulnerable Offshore Small Islands and Riverine Charland	AICVOSIRC
Contingent Valuation	CV
Contingent Valuation Method	CVM
Experimenter Demand Effects	EDE
Database of Global Administrative Areas	GADM
Humans-and-Nature	HaN
Humanitarian Data Exchange	HDX
Low Elevation Coastal Zone	LECZ
Local Government Engineering Department	LGED
Not in my backyard	NIMBY
Non-Governmental Organization	NGO
United Nations Office for the Coordination of Humanitarian Affairs	OCHA
Ordered Logit	Ologit
Principal Component Analysis	PCA
Randomized controlled trial	RCT
Regression Equation Specification Error Test	RESET
Regional office for Asia and the Pacific	ROAP
Relational Value	RV
World Food Programme	WFP
Willingness To Accept	WTA
Willingness To Pay	WTP

Abstract

Climate change is impacting the lives of millions every year, making it crucial to understand how people react to conservation. This study investigates the influence of relational values (RV) on individuals' willingness to contribute to conservation efforts, measured through Contingent Valuation (CV) methods, namely through willingness to pay (WTP) and willingness to donate. Our primary hypothesis is that RV salience will positively influence individuals' conservation behavior. Notably, after accounting for sociodemographic factors such as gender, age, marital status, education, household income and distance to waterbodies, the treatment group demonstrates a higher WTP. The relationship between distance to waterbodies and WTP is significant only when household income is considered. While the hypothetical bias is negatively correlated with the treatment, this result is not statistically significant. This study contributes to the understanding of RVs in sustainable development economics, and their potential to bolster conservation efforts in climate-vulnerable areas. Our findings emphasize the complexity of incorporating RVs into conservation strategies and highlight the necessity for further research with larger, more representative samples.

Keywords: Contingent Valuation, Willingness to pay, Relational Values, sociodemographic factors and hypothetical bias.

1. Introduction

The impacts of climate change, such as rising sea levels (Kirezci et al., 2020), changes in the occurrence, strength, duration, and geographic distribution of droughts, floods, land degradation and extreme weather events, are projected to increase (Borrelli et al., 2020; McMichael, 2023), which in turn is expected to magnify the scale of human migration and mobility (Silchenko & Murray, 2023). In a report focusing on South Asia, Sub-Saharan Africa and Latin America, Rigaud et al. (2018) predicts that climate change will push tens of millions of people to internally migrate (i.e. migrate within their own countries) by 2050. Even worse, if concrete steps are not taken, over 143 million people from these regions may be forced to move. The poorest and most vulnerable areas are likely to be hit the hardest (Rigaud et al., 2018). Bangladesh as a riverine country with flat deltaic topography and low elevation, is said to be the poster-child for climate change vulnerability (Eckstein, Künzel, & Schäfer, 2021; Chowdhury et al., 2022). Despite contributing to only 0.56% of the global emissions (Hasan & Chongbo, 2020), it ranked the seventh extreme disaster risk-prone country (Eckstein et al., 2021). About 4.4 million people were displaced internally in Bangladesh in 2020 alone, due to climate related natural disasters (Khatun & Saadat, 2022) and according to World Bank estimates, over 13 million people in Bangladesh could become internal climate migrants in the next 30 years (World Bank Group, 2022).

According to Black, Kniveton, and Schmidt-Verkerk (2013), around 90 percent of rural migrants settle in urban centers such as Dhaka, Chattogram, Khulna and Rajshahi. In this research we turn the focus on how people who have migrated (internally) to the capital- Dhaka, think (and respond) about conservation. Contingent valuation (CV) method is employed to measure respondents' willingness to contribute towards the continuation of policies in increasing the resilience, of communities living in low elevation coastal zones (LECZ) in Bangladesh. LECZs are coastal areas that are within ten meters above mean sea level (Kirezci et al., 2020), and are most vulnerable to sea-level rise as well as other coastal hazards such as floods and salt-water intrusion, coastal erosion and storm surges (Barbier, 2015; Kirezci et al., 2020).

We choose Dhaka for this study, as it is mainly on the ‘receiving’ end of the internal migration (Petrova, 2021) attracting around 400,000 internal migrants every year¹, and on the other hand is one of the most vulnerable cities in the world to the effects of climate change (Adri & Simon, 2018). Since the poorest are the most vulnerable to climate change (Penning-Rowsell, Sultana, & Thompson, 2013), our sample is taken from dwellers of settlements (i.e. slums). While these consist mainly of internal migrants (Petrova, 2021), we expect participants to come from areas both affected and not (or less) affected from climate induced problems such as erosion and salt-water intrusion.

We conduct a survey for this study, where the participants are randomly assigned to either the control or treatment group. In the control group, participants receive a neutrally framed scenario and participants in the treatment receive additional information in the form of text, tables, figures and pictures, emphasizing *relational values* towards threatened LECZ and the residents. Relational value is a newly emerged group of values to explain the multiple interconnections between people (as individual and society) and the natural world (Chan et al. 2016), where much empirical studies are still not available (Kleespies & Dierkes, 2020; Pratson, Adams, & Gould, 2023), and our study is a step towards filling the lacunae. One of the main hypotheses of this study is that the introduction of *relational value* specific information within the contingent valuation scenario leads to an increase in average willingness to contribute towards environmental conservation. We test whether treatment incorporating relational values further increases willingness to contribute in cases where a higher association to threatened places exist, such as close proximity to them. Additionally, we examine the impact of controlling for sociodemographic variables on the pro-environmental behavior of the respondents. Furthermore, we carry out a dictator game to see the level of pro-environmental behavior that respondents exhibit when faced with actual payouts. Here again hypothesize the treatment group to have higher willingness to contribute, compared to that of the control group.

¹As evidenced in the study by Anwer (2012), most internally displaced and vulnerable people try to relocate first within their home village or in the close proximity to it, which gradually shifts towards nearest towns and then to larger cities and then to the capital (Dhaka).

The paper is structured as such: the next chapter reviews existing literature and in turn positions our work, highlighting how this study is novel and contributing to the body of knowledge. This section also gives a conceptual framework for the readers, elaborating the concepts that are used throughout the study. Chapter 3 addresses the Methodology, detailing the data collection and procedures to come to the results. That escalates to the next section, namely the results and discussion section. We analyze the results in great lengths and consolidate the robustness of it. Finally, we conclude the study, showing the policy implications and possibility of future study.

2. Conceptual Framework and Literature review

This section of the study aims to sequentially progress as follows: the conceptual framework and background will introduce the fundamental concepts to be utilized in subsequent discussions, providing a backdrop for the discourse that is to follow. Thereafter, some literature on these concepts will be presented, followed by an examination of complimenting and contrasting viewpoints presented in the existing body of literature.

2.1 Conceptual Framework

2.1.1. Contingent Valuation Method and Willingness to pay

In the field of environmental economics, researchers employ various methods to estimate (or assign) the value of environment (and environmental goods) (Christie et al., 2019; Pascual et al., 2021). One approach involves estimating preference parameters as *revealed* through behavior that reflect individuals' choices and actions related to the environmental amenity in question (Liu et al., 2010 ; Tietenberg & Lewis, 2012). However, the revealed preference methods are limited to the assessment of use values (Börger et al., 2018). Another approach, known as the *stated preference*, relies on gathering information directly from individuals through surveys (Carson, 2000; Carson & Hanemann, 2005; Tietenberg & Lewis, 2012). Total economic value consists of both use and non-use values, which is captured by the stated preference method (Börger et al., 2018).

One of the *stated preference* approaches is the Contingent Valuation (CV) method (Hanley & Czajkowski, 2019), introduced by environmental economists in the mid-1970s (such as Randall,

Ives, & Eastman, 1974) and gaining momentum since the late 1980s (Gómez-Baggethun & Ruiz-Pérez, 2011). Researchers from all over the world have undertaken over 10,000 CV studies (Haab, Lewis & Whitehead, 2020), which are widely used *inter alia* to assess policy impacts (Hanley & Czajkowski, 2019; Johnston et al., 2017). CV stands out as a direct approach that enables the estimation of values that are otherwise unattainable through conventional means (Liu et al., 2010), since many ecosystem services are not traded in markets (or surrogate markets) (Faccioli et al., 2020). In its simplest form, CV uses surveys techniques to elicit individuals' preference over different actions (Haab et al., 2013). The choices of the participants are then analyzed in a way similar to the decision-making process observed in consumers in real world scenarios (Carson, 2000). Willingness to Pay (WTP) is one of the Contingent Valuation (CV) methods, where individuals state how much they are willing to contribute in order to marginally improve a particular scenario, or avoid marginal loss (Tietenberg & Lewis, 2012; Abdeta, 2022). Since losses are more starkly felt thereby creating higher discomfort or disutility, compared to the utility achieved from commensurate gain (Kahneman & Tversky, 1979), WTP is a perfect measure of the contingent valuation methods for this study (Börger et al., 2018, Bamwesigye et al., 2020).

2.1.2 Intrinsic Value, Instrumental Value and Relational Value

It is important to understand that arguments for environmental conservation have dominated environmental ethics literature for around 120 years, and as one may expect, the view is pluralistic (Hoelle, Gould, & Tauro, 2023; Pascual et al., 2021). Intrinsic value and instrumental value arguments are pre-eminent for understanding the values of nature (Kleespies & Dierkes, 2020), and relational value is an addition to the axiological categories (Himes & Muraca, 2018; Stålhammar & Thorén, 2019). Intrinsic value argument holds such that nature should be protected for its own sake, irrespective of the usefulness to human beings (Soulé, 1985; Tallis & Lubchenco, 2014). Attributing intrinsic value to non-human natural entities i.e. they are valuable in themselves and/or an end in themselves (Díaz et al., 2015), moves away from the narrow anthropocentric view on value (Justus et al., 2009), and is argued to be the least biased and most ethical valuation and reason for conservation (McCauley, 2006). Attributing instrumental values on the other hand means that something is deemed valuable if it satisfies human preferences or are means to achieve human ends (directly or indirectly), at presence or in future (Pascual et al., 2017; Christie et al., 2019). Consolidating the importance of nature strictly to intrinsic, instrumental and monetized

values cannot totally encapsulate the intuitive ways decisions are formulated and how the world is understood (Klain et al., 2017). This realization of the gap in including the intangible values, such as connectedness and belongingness as well as sense of relationship between people and ecosystems, led to concerted efforts from researchers from variegated backgrounds, such as economics, ecology, political science and so on (Klain et al., 2017). A recent (novel) addition to the category of values to account for and explain environmental behavior is Relational value (RV) (Inglis & Pascual, 2023; Kleespies & Dierkes, 2020). The term was coined by Chan et al. (2016), which refer to the preferences, principles and virtues associated with human-nature interaction, relationships and responsibilities (Inglis & Pascual, 2023). Given that the term "relational value" was introduced relatively recently in 2016 (Chan et al., 2016), the existing literature on this concept is limited (Hoelle et al., 2023; Kleespies & Dierkes, 2020). However, many studies² conducted prior to the coinage of this term can be considered as clear indicators or effective proxies for understanding relational value, while others seem to conflate more towards instrumental values, due to their anthropocentric approach (Pratson et al., 2023). According to Himes and Muraca (2018), RV is an anthropocentric yet non-instrumental view. Due to the significance of this concept, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)³ conceptual framework included *relational values* to its mandate (Klain et al., 2017).

By associating value of Nature's contribution to people (hereon NCP⁴), Pascual et al. (2017) turns to explain how differently the word *value* can mean in different contexts and that it is crucial to avoid conflating the diverse meanings, even though they may be interrelated and inseparable. It can be used to explain the *principle* within the context of specific worldview or cultural framework, *preference* of a desired outcome, the *importance* intrinsically or for others, or simply a *measure*. Policy discourse on the need for valuation of NCP hence is closely related to either utilitarian economic view, or with an environmental ethics point of view, which seems to be part of the instrumental value vs intrinsic value rhetoric. Pascual et al. (2017) also explains how diverse values related to nature, NCP and good quality of life are interdependent. On one hand it is true

² such as Brehm et al. (2013) about sense of place, Devine-Wright (2013) on identity and nature connection, local and indigenous ecological knowledge by Schultz (2002) to name a few (Pratson et al., 2023).

³ IPBES is a United Nations entity that seeks to summarize scientific information for application in environmental policy (IPBES (2022)).

⁴ The IPBES category of Nature's contribution to people (NCP) refers to the positive contributions and benefits as well as (occasionally) the negative contributions or losses that people obtain from nature, which resonates closely to ecosystem services in the literature (Pascual et al., 2017).

that nature's intrinsic value plays important role in decision making according to the IPBES framework, on the other hand it is also noteworthy that much of the decision making may stem from the instrumental values of NCP (Pascual et al., 2021).

A potential cause of a poor fit of the instrumental value orientation is that by definition they are substitutable, but nature or cultural values are actually not (Klain et al., 2017). Moreover, NCP may intertwine with individual's sense of identity, establishing a connection to *relational values* that emanate from the (intricate) relationships and responsibilities humans hold towards nature (Himes & Muraca, 2018). It is thus posited that NCP values are more flexible by nature, thereby making it challenging to rigidly classify them into distinct categories of either instrumental or relational values (Pascual et al., 2017). Schröter et al. (2020) buttresses the argument of Pascual et al. (2017), stating that it is often not possible to draw out clear distinctions between intrinsic, instrumental and relational values, and that these values are in a gradient or continuum, a conclusion that Luque-Lora (2023) also supports. There also seem to remain overlaps and synergies between the values (Deplazes-Zemp & Chapman, 2021).

Even though intrinsic and instrumental values are very important explicative to conservation (Tallis & Lubchenco, 2014), thinking only in these terms may not be enough (Chan et al., 2016), as it may foster 'NIMBY' (not in my backyard) thought process, which may therefore thwart responsiveness from people and lead to less WTP from individuals (Sun, Yuan, & Yao, 2016) and/or (even) may lead to apathy (S. C. G. Thompson & Barton, 1994). Relational values, according to Chan et al., (2016) is applicable to all aspects of relationships between human and nature, together with the relationships between people but involving nature. They also encompass the values associated with a good life, or *eudaimonic* values and are thereby not inherent in things, but derived from the relationships and responsibilities to them (Chan, Gould, & Pascual, 2018). Additionally, it is noteworthy that an entity can be valuable for many different reasons, with different sources such as aesthetics, ecological and/or ecosystem services, scientific and medical, touristic, recreational, educational, spiritual and such forth (McCauley, 2006 ; Justus et al., 2009) as well as individuals' experience, own value system and abilities to work with nature (Pascual et al., 2021). Relational values have influence from social perspective, and the violation of it profoundly affects the impacted community (Kleespies & Dierkes, 2020). The distinction compared to that of instrumental value is pivotal, for example the destruction or displacement of

a habitat, from an instrumental point of view, may not be a big issue as it may be relocated (or replaced) to provide the same ecosystem service. Hence, Himes and Muraca (2018) points out that RVs are not ends in themselves, rather provides important factors towards sustainability and environmental conservation. In a systematic review on relational value, Pratson, Adams and Gould (2023) finds that there are different variants of the definition of RV, mainly stemming off of the one by Chan et al. (2016). Some definitions focus on specific characteristics and mechanics of RV, some shed light on how RV is formed, and some on what RV does. According to Dawson et al. (2023), for example, RVs encompass connections, such as how nature influences an individual's or communities' identity rooted in a specific place, social interactions, or culture. This is in support with Grubert (2018) that, in the context of RV the emotional attachment and sentiments tied to a location are irreplaceable (Grubert, 2018). We also try to explore this notion further in our study.

One concern about valuation, as raised by Díaz et al. (2018), is that the ecosystem service framework is mainly focused on the western, scientific concepts and as such miss out the values associated with indigenous and local knowledge, which however IPBES aims to address (Christie et al., 2019).

It is also noteworthy that the majority of literature on RV focuses on relations that are deemed desirable or beneficial to humans and/or nature, thereby addressing the *pro-sustainability* aspect of RV (Hoelle et al., 2023). Additionally, Hoelle et al. (2023) delve into the exploration of aspects of RV that are also not (so) beneficial, thereby providing a more holistic view of the RV concept. As a small critique to seminal works such as Chan et al.'s (2016) 'Why protect nature', Hoelle et al. (2023) states that there exists a pattern of framing of the RV concepts in a normative way such that only pro-sustainability values are highlighted, in spite of the definition being open to all relationships with nature, be it sustainable or not. Studies like Chan et al. (2018), Knippenberg et al. (2018) and so forth however offers a rationale for focusing on the positive RV as it may pave to take steps towards sustainable future and sustainability in general, which in essence acknowledges the distinction of 'positive' RV from RV in general (Hoelle et al., 2023). Study by Chapman, Satterfield, and Chan (2019) on the other hand are among the few studies that addresses both positive and negative RV.

2.1.3 Identity and priming

Akerlof and Kranton (2000) introduced identity- the sense of one's self, which is a subject of discussion in psychology and sociology, into economic models. It is important since it has an impact socially, behaviorally as well as in economics (Akerlof & Kranton, 2000). According to 'Self-Categorization theory', each individual belongs to multiple social categories such as religion, occupation, sex, place of belonging, and such forth (Hauge, 2007). Each of these categories come with its own sets of norms and behavior expectations (Reynolds & Subasic, 2016). An individual is likely to behave according to the norms of categories that are more salient at any given time (Benjamin, Choi, & Strickland, 2010). However, there are many background variables, such as childhood home environment, that may affect behavior as well, irrespective of observability and also irrespective of their measurements (Benjamin, Choi, & Fisher, 2016).

Ku and Zaroff (2014) did an experimental study using priming to see the effects of intrinsic relative to extrinsic values on WTP to environmental protection. Here however, the values are related to the 'Self-determination theory', where the motivation to act a certain way may come from a continuum of intrinsic and extrinsic factors (Ryan & Deci, 2002). Ku and Zaroff (2014) find that the salience of intrinsic and extrinsic motivations help to measure the effects on the attitudes and behaviors. We also plan to the priming of RV aspects in our study to see its impact on the WTP of the respondents.

Rationale for priming RV aspects

The priming mechanism is widely recognized in scientific literature: the presentation of stimuli triggers associative memory, amplifying a specific attitude more, thereby rendering it more prominent/salient and more pertinent to the decision-making process (Akerlof & Kranton, 2000). According to Kahneman (2011), many of the heuristics of our judgements and choices are influenced by System 1, which is based on intuition and associative memory. Many a studies are done to check if and how the individual behavior is influenced by external stimuli (Weingarten et al., 2016), and how nudging/priming influences individual WTP (Koçaş & Dogerlioglu-Demir, 2014) for environmental quality (Wee, Choong, & Low, 2021). We take a look into one such study by Bimonte, Bosco, and Stabile (2020) where they use visual priming technique to make pro-environmental attitudes more salient and in-turn see if the WTP is affected.

Visual priming, according to Bimonte, Bosco, and Stabile (2020), enables the direct communication of diverse (environmental) settings, facilitating the examination of the influence of both negative and positive frames on individual behavior. They find that a nudge that reminds people of the loss of environment and quality of life is more effective than a nudge that focuses on reducing pollution. We follow in their footsteps and design our priming mechanism, focusing on the loss of ways of life and places of origin due to soil erosion and flood, as explained in methodology section. Furthermore, they find that the priming effects the WTP, which is consistent with loss aversion of individuals as well as a result of endowment effect (Bimonte, Bosco & Stabile, 2020). Moreover, according to Pratson, Admas and Gould (2023), RV has strong association to pro-environmental behaviors, which we expect to see in our study as well.

2.1.4 Dictator game

According to economic theories of rationality, individuals act in self-interest and thus would only behave in a way that would increase their individual returns and/or utility (K. J. Arrow, 1986). This notion is challenged by researchers such as Kahneman et al. (1986), who have time and again found that humans are systematically more sympathetic and prosocial than *homo economicus* (Engel, 2011). Researchers develop economic social decision-making tasks or games to emulate the complexity of real-life situations, enabling the assessment of actual prosocial behavior in a standardized experimental setting (Thielmann, Spadaro, & Balliet, 2020). Dictator game, a simplified version of economic game of Kahneman et al. (1986) developed by Forsythe et al. (1994), is one of the most commonly used methods used by experimentalists, to come to the conclusion about prosociality (Engel, 2011; Thielmann et al., 2020).

The (standard) dictator game is a one shot, two player game where one of the players, the dictator, is endowed with an amount. The dictator has to decide how the endowed amount should be distributed between him(her)self and the other player, the recipient. The dictator has an option to allocate any amount, including zero and the maximum of the endowed value to the recipient, while the recipient must accept the decision of the dictator (A. M. Ahmed & Salas, 2011). Real life example of a dictator game includes donation decisions, such as donating money to a charity/individual (Thielmann et al., 2020). Generosity in lab and charitable giving outside the lab is found to be positively correlated (Benz & Meier, 2008). Hence, we include a dictator game element (i.e. donation exercise) in our study, as explained in the methodology section.

2.2 Literature review

2.2.1 Supporting studies:

The primary and ongoing objective of environmental valuation is to facilitate the incorporation of environmental impacts into cost-benefit analysis (Perman et al., 2003; Bamwesigye et al., 2020) and to facilitate scientifically informed assessment for decision making (Stålhammar & Thorén, 2019). However, this approach has sparked a contentious debate within the environmental science community, raising concerns *inter alia* that the preferences and values related to indigenous and local knowledge are often not accounted for, in the process of following western concepts and frameworks (Christie et al., 2019; Díaz et al., 2018). Some support valuation and market solutions as effective strategies for addressing environmental issues, whereas others reject utilitarian rationales for conservation (Hanley & Czajkowski, 2019). Acknowledging the fact that the valuation efforts cannot, or at the very least is yet to, encompass all dimensions of value (Chan, Satterfield, & Goldstein, 2012), a middle ground exists, and that is to endorse valuation as a short-term tool to communicate the value of biodiversity (Gómez-Baggethun & Ruiz-Pérez, 2011).

2.2.1.a WTP and conservation focusing on developing countries

WTP as a Contingent Valuation(CV) method is a strong Stated Preference (SP) method that is applied widely for conservation decisions and valuations (McFadden & Train, 2017) in both developed and developing countries (Abdeta, 2022). A systematic literature review focusing on the WTP for conservation of forests by Abdeta (2022) finds that contribution by general public (as assessed by WTP) is crucial for developing countries' conservation steps and disaster responses. This may be due the slow reaction of the government (Shughart, 2006), as well as due to limited budgetary capacity of the government, necessitating public involvement to address the financial requirements for effective conservation measures (Berrebi, Karlinsky, & Yonah, 2021). However, according to Gibson et al. (2016) and Kassahun et al. (2020),the use of monetary metrics such as WTP may lead to inaccuracies in the context of developing countries. This discrepancy may arise from respondents' unfamiliarity with such welfare systems and potential constraints such as financial constraints, impeding their ability to freely express their preference (Gibson et al.,2016). In order to address this problem, it is proposed by various economists to use non-monetary payment in addition to monetary payments (Gibson et al., 2016; Kassahun et al., 2020).

Non-monetary payments including bag(s) of rice, crops, meals, labor time and such forth, which even though unconventional, translates better to the respondents in terms of what they are forgoing (Abdeta, 2022). Taking these learnings into account, we include a chart with different commodities like rice, lentil etc. that are opportunity costs to different wtp amounts, as detailed in the methodology section (see Figure 5).

2.2.1.b Using questionnaire in exploring Values

Arias-Arévalo, Martín-López, and Gómez-Baggethun (2017) did an empirical study with 589 respondents from urban and rural areas of Otún River watershed, in Colombia, to explore the different values (intrinsic, instrumental and relational values) for sustainable management of social-ecological systems. In their study and from literature review of other studies, they find that focusing only on monetary valuation may ignore intrinsic and relational values and (over)emphasize instrumental values. Scholars in the field recognize the presence of value pluralism, where different values can exist and sometimes conflict with each other. These values cannot be combined, simplified or be reduced into a single perspective or into each other. (Pascual et al. 2017, Arias-Arévalo et al., 2017).

The study by Arias-Arévalo et al. (2017) is particularly interesting for our research, as it employs questionnaire surveys to access the existence of the values. They employ quantitative approach through survey questionnaire and find the differences in the prioritization of valuations between two groups (urban and rural respondents) via Mann-Whitney test. Furthermore, multivariate logistic regression and Odds Ratio are also used. Content analysis is done to classify 20 articulated values and the 3 value domains (intrinsic, instrumental and relational) for the qualitative (open-ended) questions. The Mann-Whitney U test is used to explore the differences between the rural and urban respondents' frequency of mention of environmental values. Before the face-to-face questionnaires are conducted, a draft of the questionnaires is pretested and revised. In this study, it is evident that people can endorse multiple values to the same ecosystem, which signals that value pluralism integration is important in environmental valuation. Moreover, the study finds prioritization of the domains of intrinsic and relational values by rural population i.e., rural people have more pro-environmental concerns due to stronger connection to ecosystem through cultural relations as well as material dependence on nature. The mention of instrumental value, even though is low for both groups, is observed to be mentioned more frequently by the urban group. With

regards to other socioeconomic factors, Arias-Arévalo et al. (2017) find that respondents with higher educational level are highly likely to express intrinsic and relational values. It is however mentionable that RV is mentioned the most among both urban and rural interviewees. The study also finds that higher altruism leads to higher probability of mentioning RV, which is in line with the argument of Chan et al. (2016). Furthermore, Arias-Arévalo et al. (2017) also conclude that rural people need to be included (more) in environmental management because of their concern for RVs, as it would also reduce environmental management conflicts.

The bottom line of the study by Arias-Arévalo et al. (2017) is that RVs concerning the local livelihoods and social practices is the dominantly expressed motivation towards the ecosystem protection (of the watershed). This study is particularly interesting to our study as we are also conducting an empirical study and will also see how socioeconomic factors come into play towards environmental valuation. Apart from the differences in objective, we take the learnings from the study by Arias-Arévalo et al. (2017) and implement them in the context of our study.

2.2.1.c Quantitative study to assess wtp towards conservation

Bamwesigye et al. (2020) conducts a quantitative cross-sectional study to see the individuals' wtp for forest existence and sustainability in Uganda. They hypothesize that the wtp depends on the preference for forest existence, which is further influenced by socioeconomic characteristics such as gender, household income and education level. There exists a very weak positive relationship between the gender of the respondents' and the willingness to pay. However, education and household income did not influence the wtp. We find these worth exploring in our study as well, to see if similar feats hold. It is mentionable that Bamwesigye et al. (2020) concluded the study remarking that the sample size of 203 interviewees is not enough to generalize the findings to the entire population of Uganda and that more regionally distributed sample sizes of at least 1000 participants may be necessary to increase representativeness. While we acknowledge this conclusion, it falls beyond the scope of our study due to budgetary constraints.

This study bears relevance to our research as we similarly undertake a cross-sectional study and investigate the potential impact of socioeconomic characteristics on the WTP for conservation. By integrating the elicitation of RV to assess its influence on WTP, our study contributes to the existing literature on conservation related WTP.

2.2.1.d How vulnerabilities shape perception and influence behavior

A study is conducted by Anshuka et al. (2021) on how climate related vulnerabilities shape risk perception and influence adaptive strategies of Indo-Fijian farming communities . The case study is done in low-lying islands, which are vulnerable to hydro-meteorological hazards like floods, droughts and cyclones. This study is especially interesting for us since Bangladesh is also a low-lying deltaic country ,which is also faces sea level rise and are also prone to the same hydro-meteorological hazards (Asian Development Bank, 2021; Eckstein et al., 2021). The study by Anshuka et al. (2021) is done on 36 Indo-Fijian households. One of the key findings from this research is that farmers who perceive themselves to be highly vulnerable are more likely to embrace adaptive strategies. They also find that members of the community who have lower levels of social cohesion tend to have a rather individualistic approach to tackle disasters. Another finding of this study is that the vulnerable generally have a sound understanding of the risks and hence the authors recommend combining the citizen or local knowledge along with scientific knowledge to have a better understanding and analysis of hazards. This literature is interesting for our study as we focus on climate change vulnerable people and see if the findings of the study are aligned with ours. However, a research gap that we think this study has is that it did not elicit WTP of respondents to avoid such vulnerabilities, and this is how our research could be making an additional stride in better understanding risk perceptions and behaviors that stem out of it. Moreover, another differentiating factor from this study with our study is that it is a qualitative study with a rather small sample size, while ours is a quantitative study with a substantially larger sample size.

On a similar note, Steimanis, Mayer, and Vollan (2021) find that most people when faced with climate related vulnerabilities, prefer staying where they are and consider moving away only as the last resort, due to higher place attachment even though the risk aversion increases. Moreover, an interesting find of this study is that people who experienced hazards have an aspiration to move to high-income destinations. The study has employed a quantitative method of surveying 624 individuals in Bangladesh and Vietnam. In this study the authors analyze people's place attachments, risk aversion and how extreme weather conditions have impacts on it. They also observe a positive correlation between individuals' exposure (and experience) to hazards and their aspirations to relocate to high-income destinations, which may exceed their actual capacity to do

so. Consequently, this heightened aspiration may paradoxically deter them from relocating altogether. This study holds particular interest for our research as it draws its sample also from Bangladesh, as we do in our study. However, we pivot towards exploring how RV aspects prompt individuals who have already migrated to contribute towards conservation efforts or help others in remaining in their current location and possibly move back to their places of origin, albeit hazardous.

2.2.1.e Exploring Socioecological Indicators for Relational Values

In line with the IPBES framework, Schröter et al. (2020) wants to explore the lacunae in literature by identifying socioecological indicators as proxies to be used to assess relational values on NCP, in Europe and Central Asia. Based on the literature analysis on the said region, the authors devise an analytical framework that encompasses four dimensions of RV, including collective notions of security and sovereignty, health in pursuit of a good quality of life, contextual values associated with equity and justice, and aspects of natural heritage, social identity, and environmental stewardship that is operationalized on three of the eighteen NCP categories devised by Díaz et al. (2018). In this study, the researchers focus on the collective notion of RV and leave out the RV related to that of individuals. It is mentionable that the study only focuses on the positive RV and according to their analysis it is often not possible to differentiate between instrumental, intrinsic and relational values. Luque-Lora (2023) supports this finding, as detailed later in this section. Moreover, Schröter et al. (2020) suggest overlaps and synergies between the different value dimensions that they focus on, namely security and sovereignty, health, as well as equity and justice. This overlap means that some indicators are useful on multiple value dimensions. While doing this research, Schröter et al. (2020) finds large RV literature gap, especially in the Central Asia region. This gap in knowledge underscores the importance of directing attention towards vulnerable developing countries such as Bangladesh. Our study contributes to addressing this gap by offering insights and analysis aimed at advancing understanding in this area.

2.2.1.f. RV as a motivation towards conservation

Knippenberg et al. (2018) takes a look into relational values and eudaimonia. They interview 105 actors involved in nature conservation, such as NGOs, government and so on. The researchers look at the relational value aspects not only empirically, but also from the lenses of mysticism and religion. The human-nature relationship and religion has also been explored by Haq (2001),

Jackson and Palmer (2015) and also touched upon by Chan et al. (2016). As explained before, relational value might be both positive or negative, and Knippenberg et al. (2018) acknowledges that, but also declares their intention of pursuing the positive valuable relations in their study. Knippenberg et al. (2018) sees relational value as a part of a triad and that in the realm of relational value, its locus extends beyond nature alone to encompass the entire triad comprising humans, nature, and their relationship. A ranking task is integrated, requiring individuals to rank various pre-formulated statements based on their perceived value. The study reveals that conservation motivations predominantly align with RVs. Intrinsic value emerges as the second-highest ranked option among the choices. We find this technique interesting and worth adapting into in our study.

The utilization of the European Humans-and-Nature (HaN) scale based on environmental ethics in Europe reveals massive adherence to Stewardship of nature, as well as high adherence to scales of Partnership with nature and Participation in nature, across European countries. The HaN scale implemented in Southeast Asia reinforces the fact that relational value is rather universal than cultural (Knippenberg et al., 2018; Duong & van den Born, 2019). It is further recommended by Chan et al (2016) to involve people in nature-inclusive activities as it helps in internalizing relationship with nature and induce nature-inclusive eudaimonia. For a more comprehensive literature review on human-nature relationship, which is not the purview of this study, readers are encouraged to read the systematic review by Pratson, Adams and Gould (2023).

The study by Knippenberg et al. (2018) is of interest to our study as we focus on understanding the role of RV in the willingness to contribute to conservation efforts, thereby building upon the findings and methods of their study. It is mentionable that the ranking task employed in this study is particularly interesting, and we will try to emulate this in our study.

Another interesting contribution to the RV literature is the one by Ishihara (2018), where she looks from the sociology perspective. The theoretical contributions in sociology, especially the notion of *habitus* as developed by Bordieu (1990) is brought together. Ishihara posits that just as culture is shared and internalized as habitus, so are relational values.

2.2.2 Evaluative studies:

2.2.2.a Criticism to Contingent Valuation method

Andreoni (1989) originally developed the concept of ‘warm glow’, that refers to any utility that an individual gains from personally donating towards a public good. According to Bishop (2018), since the CV questions are hypothetical, people take advantage of the opportunity to gain positive feelings at no cost, for hypothetically supporting/donating towards a public good such as conserving the environment. Critics have detailed that the individuals’ responses to CV questions serve the purpose of charitable giving, which comprises of not only the support for the charity (or charitable cause), but also to feel the *warm glow* (Bishop, 2018). Hence CV responses should be regarded as a means to check the approval of the cause at hand, rather than estimates of actual willingness to pay (Hausman, 2012). It should also be kept in mind that *warm glow* may be a threat to the validity of contingent valuation studies (Krupnick & Adamowicz, 2007; Bishop, 2018). Moreover, in his systematic literature review, Abdeta (2022) finds that most of the studies lack appropriate design and implementation of CV survey.

One method of application of the CV study is through taxes. According to Eckel, Grossman and Johnston (2005), there is no association (positive or negative) between warm glow and paying taxes, but Bishop (2018) expect the relationship to (more likely to) be negative, due to the tax aversion attitude of people generally, thereby leading to lower utility. If the payment vehicle does not match the reality (i.e., how the payments may be actually made), then there is a chance of bias (Bishop, 2018). Hence in our study we keep the payment scenario as a voluntary one-time payment exercise. Furthermore, the warm glow might vary across different payment vehicles. In any case, warm glow does not invalidate a CV study (Bishop, 2018). According to Carson (2012), in order to get the best out of a CV survey, it is imperative to convey to the respondents that the government is considering implementing a policy and that their responses will be helpful in formulating the decision. We implement this in our study as well.

Hausman (2012) pointed out that over the years of CVM research, it did not prove to be able to solve the pitfalls that it initially had, a stance that his co-author (Peter Diamond) was convinced of 20 years prior. He argues that there continues to exist a) hypothetical bias, b) large difference between WTP and WTA and finally c) scope and embedding problem, which he argues to be the

biggest bane of CV studies. Hausman argues that the respondents usually come up (or invent) their answers arbitrarily, as the valuation usually varies over time and situation. He posits that the CV studies either fail the scope test or does not adequately pass it. To counter the very strong wording of Hausman, where the title indicates CVM to be hopeless, Haab presents the following arguments: Although hypothetical bias might exist in any stated preference study, as pointed out by Hausman, Haab (2013) argues that the example papers that do not account for the incentives of the respondents. According to Carson and Grooves (2011), without examining the incentive structure of a stated preference study, one cannot judge if the distortions are due to hypothetical bias.

Not debunking Hausman's claim about the WTP and WTA difference, Haab (2013) refers to Hanneman's (1991) argument that substitutability of goods may impact the difference between WTP and WTA. Moreover, Haab (2013) posits that this area remains fertile ground for research on the WTP/WTA discrepancy, and in no way should it be considered the bane of CVM studies.

Haab (2013) criticizes Hausman's advocacy of the *adding up test*, as it imposes a specific structure on preference functions of the respondents and increases cognitive difficulty. Furthermore, referring to some studies, Haab (2013) points out that there are mixed results regarding the success of scope tests, and that critics argue that *adding up test* may not be suitable due to its complexity and high costs.

Hausman claims that due to the various problems of CV studies, the results may have validity-issues and hence useless for proper analysis. According to Welling, Dehnhardt, and Aß (2023) for stated preference methods, even though concerns regarding validity may exist, it is not a major barrier towards the usage of the results by the policy makers, which invalidates Hausman's claims.

With around 50 years and over 10,000 studies on CV (Tim Haab et al., 2020), one should tread with caution before nullifying the merits of the method. Since we use CV method for our study, we find this debate interesting and enriching.

2.2.2.b Evaluative study on RV

Stålhammar and Thorén, (2019) interprets that Chan et al. (2016) makes at least three claims as to what constitutes RV, which may be aligned into the fields of environmental ethics, ecosystem services valuation and environmental psychology. Environmental ethics involves the philosophical study of the normative foundations that provide guidance on how individuals ought to behave in

relation to nature (Stålhammar & Thorén, 2019). The term ‘relational value’ however is not a part of the standard environmental ethics nomenclature, and in fact some philosophers (such as Picolo, 2017) are suspicious of its recent rise (Stålhammar & Thorén, 2019). While RV appears to widen epistemological perspectives in environmental valuation, some argue that similar ideas existed within the ecosystem service valuation literature, suggesting RV as an evolution rather than a completely new concept (Stålhammar & Thorén, 2019). For instance, according to Stålhammar and Thorén (2019), RV draws on Brown’s (1984) idea of values influencing implicit preference judgements. Tadaki et al (2017) posits that RV exceeds the premise for valuation, based on preferences as in the cases of intrinsic and instrumental valuation, in that it includes what different ecosystems *mean* to people. Fish et al (2016) conceptualizes that cultural ecosystem services are based on a relational approach, which is an advancement to the empirical and analytical categories of ecosystem services, rather than a new category of values. Moreover, it is mentionable that ecosystem services valuation in general is not a comprehensive field, rather an amalgamation of interdisciplinary research efforts (Maes & Burkhard, 2017), which is recently broadened to include various philosophies and methodologies (Braat, 2018). Upon analysis from different points of view, Stålhammar and Thorén, (2019) concludes that there is not much merit of RV as a values category, rather is well suited an interdisciplinary object or epistemological framing. Moreover, the concept has the potential to facilitate the interchange of ideas across different disciplines (Stålhammar and Thorén, 2019).

Further criticism comes from Luque-Lora (2023), where he posits that the word ‘value’ in RV is differently meant compared to that of intrinsic and instrumental values, which in-turn questions the very plausibility of having a separate value category than the other two. The noun ‘value’ may be defined as the goodness or worth of something, and another way to define it would be the guiding principles and ideals of something (an example sentence is: ‘values instilled in children lasts a lifetime’). The former definition is used for categorizing the instrumental and intrinsic value of something, while as defined by Chan et al. (2016)⁵, the value in RV seems to fall under the second definition. Furthermore, Luque-Lora (2023) argues that in order to have a separate value, they need to be distinct from each other, which arguably is not the case for relational values (Luque-Lora, 2023). In fact, according to some scholars, all values are in one way or other

⁵ Chan et al. (2016) defines RV as the preferences, principles and virtues associated with relationships.

relational (Luque-Lora, 2023; Maier & Feest, 2016; Norton & Sanbeg, 2021). However, it must be kept in mind that the definition of RV is also very broad, and according to a systematic review by Pratson et al. (2023), there are more than 300 unique RV (categories) thus far. Luque-Lora (2023) further argues using some examples that there is much overlaps between *held values* and RV, even though the notion was denied by Chan et al. (2018), pointing out that held values are abstract principles and not concrete relations (Luque-Lora, 2023).

Luque-Lora (2023) also states that people do not value nature in three distinct ways (instrumental, intrinsic and relational) and that the delineation of relational value neglects or denies the relationality inherent in the intrinsic, instrumental and guiding principles (held values).

In the following table (Table 1), we summarize the studies which are discussed in this (sub)section and draw the connection to our study.

Table 1. Summary of literature and connection to our study

Study	Interesting contributions	Relevance to our study
Exploring intrinsic, instrumental, and relational values for sustainable management of social-ecological systems (Arias-Arévalo et al., 2017)	<ul style="list-style-type: none"> • An empirical study (questionnaire surveys) with 589 respondents • explores the different values (intrinsic, instrumental and relational values) for sustainable management of social-ecological systems. • value pluralism integration is important in environmental valuation. • finds that socioeconomic factors such as location (urban vs rural), education level impacts the individual environmental valuation. 	<ul style="list-style-type: none"> • Similar to our study in that ours is also an empirical study and we will see how socioeconomic factors come into play towards environmental valuation. • We follow the process in surveying as it is in this study. For example, <i>inter alia</i> we will also pretest the survey instrument.
Bamwesigye et al. (2020)	<ul style="list-style-type: none"> • empirical study involving 203 interviewees for a quantitative cross-sectional study to see the individuals' wtp for forest existence and sustainability in Uganda. • It is hypothesized that wtp depends on the preference for forest existence. This study also takes account of the fact that socioeconomic characteristics can influence the wtp as well. 	<ul style="list-style-type: none"> • The study is similar to ours in that, ours is also a cross-sectional study. • Similar to this research, we also investigate the potential impact of socioeconomic characteristics on the WTP for conservation.

<p>Vulnerabilities shape risk perception and influence adaptive strategies to hydro-meteorological hazards: A case study of Indo-Fijian farming communities (Anshuka et al., 2021)</p>	<ul style="list-style-type: none"> • A qualitative study on how climate related vulnerabilities shape risk perception and influence adaptive strategies of Indo-Fijian farming communities. The respondents are 36 Indo-Fijian households. • This study finds that members of the community who have lower levels of social cohesion tend to have rather individualistic approaches to tackling disasters. • According to Anshuka et al., the vulnerable people generally have a sound understanding of the risks 	<ul style="list-style-type: none"> • The case study is done in low-lying islands, which is susceptible to hydro-meteorological hazards, similar to Bangladesh. • A difference from our study is that this is a qualitative study while ours is a quantitative one, with larger sample size. • we elicit WTP of respondents to avoid climate vulnerabilities, which is not in the purview of this study
<p>Why do people persist in sea-level rise threatened coastal regions? Empirical evidence on risk aversion and place attachment (Steimanis, Mayer & Vollan, 2021)</p>	<ul style="list-style-type: none"> • An empirical study using quantitative method of surveying 624 individuals in Bangladesh and Vietnam. • The study observes a positive correlation between individuals' exposure (and experience) to hazards and their aspirations to relocate to high-income destinations, which may exceed their actual capacity to do so. Consequently, this heightened aspiration may paradoxically deter them from relocating altogether. 	<ul style="list-style-type: none"> • This study analyzes people's place attachments, risk aversion and how the extreme weather conditions have impacts on it. Part of the sample of the study is drawn from Bangladesh, hence this study may be comparable to ours. • However, our study differentiates to this study by looking at the relational value aspects and trying to figure out how people who have already internally migrated still wish to contribute towards conservation
<p>Indicators for relational values of nature's contributions to good quality of life: the IPBES approach for Europe and Central Asia (Schröter et al., 2020)</p>	<ul style="list-style-type: none"> • A study focusing on the literatures in Europe and Central area, where the authors devise an analytical framework that encompasses four dimensions of RV including collective notions of security and sovereignty, health in pursuit of a good quality of life, contextual values associated with equity and justice, and aspects of natural heritage, social identity, and environmental stewardship. • The study focuses on the collective notion of RV and not RV related to individuals. Also, this study only focuses on the positive RV. • In this study, Schröter et al. (2020) find that it is often not possible to differentiate between different types of values, but these overlaps are rather synergies. 	<ul style="list-style-type: none"> • We take in the learnings from the study which focuses on RV, in a theoretical context. • Here Schröter et al. (2020) look at the studies from Central Asia as well, which may be helpful for our empirical study. • Finally, they conclude that there is not enough RV literature especially for the Central Asia region, and in extension this acts as our motivation as we focus on a developing country in South-East Asia.

<p>Relational value, partnership, eudaimonia: a review (Knippenberg et al., 2018)</p>	<ul style="list-style-type: none"> • An empirical study interviewing 105 actors involved in nature conservation, such as NGOs, government and so on. • The researchers look at the relational value aspects not only empirically, but also from the lenses of mysticism and religion. • Knippenberg et al. (2018) sees relational value as a part of a triad and that in the realm of relational value, its locus extends beyond nature alone to encompass the entire triad comprising humans, nature, and their relationship. 	<ul style="list-style-type: none"> • A ranking task is integrated, requiring individuals to rank various pre-formulated statements based on their perceived value. We try to integrate this into our study as well. • This study adds value from a religious, mystic and philosophical viewpoint in a more qualitative manner. We use this knowledge as backdrop and try to quantify our results, along with the pursuit to see if this relation leads to higher WTP towards conservation
<p>Debate on stated preference and CV studies (Krupnick & Adamowicz, 2007; Gómez-Baggethun & Ruiz-Pérez, 2011; Hausman, 2012; Haab, 2013; Johnston et al., 2017; Hanley & Bishop, 2018; Hanley & Czajkowski, 2019; Haab, Lewis & Whitehead, 2020)</p>	<ul style="list-style-type: none"> • According to Krupnick & Adamowicz, (2007) and Bishop (2018), CV responses may be influenced by seeking <i>warm glow</i>, which may impact the validity of the study. • Abdeta (2022) found that many CV studies lack appropriate design and implementation, also raising concerns about their validity. • Hausman (2012) highlights persistent issues in CV studies, including hypothetical bias, differences between willingness to pay (WTP) and willingness to accept (WTA), and scope and embedding problems. • Haab (2013) counters Hausman's arguments, suggesting that incentives, substitutability of goods, and complexities in scope tests should be considered. • Welling, Dehnhardt, and Aß (2023) argue that validity concerns in stated preference methods do not necessarily invalidate the results for policymakers' use. 	<ul style="list-style-type: none"> • Since we use CV method for our study, we find this debate interesting and enriching. • Carson (2012) emphasizes the importance of conveying to respondents that their responses will influence policymaking, a principle implemented in our study.
<p>Three perspectives on relational values of nature (Stålhammar & Thorén, 2019)</p>	<ul style="list-style-type: none"> • Stålhammar & Thorén point out that RV is not part of the environmental ethics nomenclature. While RV appears to widen epistemological perspectives in environmental valuation, Stålhammar & Thorén suggest that RV is an evolution rather than a completely new concept. • According to Stålhammar and Thorén, the concept (of RV) has the potential to facilitate the interchange of ideas across different disciplines. 	<ul style="list-style-type: none"> • The counterargument regarding RV presented in this study adds an additional dimension to our comprehension of the concept, which we employ extensively throughout our paper.

The Trouble with Relational Values (Luque-Lora, 2023)

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| <ul style="list-style-type: none">• A combination of theoretical and empirical study involving 41 semi-structured interviews.• Relationality is inherent to various types of values (instrumental, intrinsic and held values), making it difficult to differentiate relational values from other categories. Luque-Lora points out the differences in definition of values, which is largely based on semantics, and argues that RV is not a required third category of values. | <ul style="list-style-type: none">• The counterargument regarding RV presented in this study, even though adds a new perspective to our understanding, does not affect the objective of our study. |
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We incorporate the insights from the above discussed conceptual and empirical studies into our research, as detailed in the forthcoming methodology section.

3. Methodology

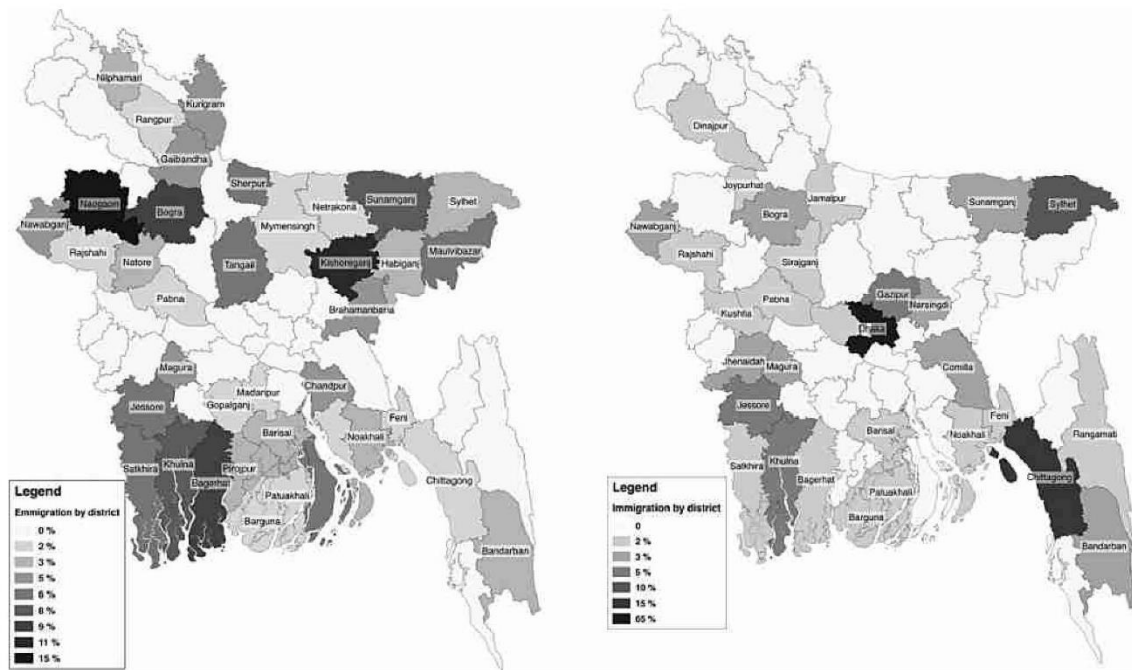
This study employs both primary and secondary data sources. Secondary data sources encompass a diverse array of national and international studies, reports, and documents, including peer-reviewed research obtained from databases such as Web of Science, SCOPUS, and Google Scholar, with their impact factors assessed⁶. Primary data is obtained through a randomized controlled trial (RCT) is conducted in Dhaka, the capital city of Bangladesh. A structured set of questionnaires is developed for the study, designed to collect quantitative data. The questionnaires also include a comment section, to allow respondents to provide additional feedback. The survey instrument is designed in accordance to the contemporary guidelines outlined by Johnston et al. (2017), as well as taking guidance from Klain et al. (2017). The average interview duration is approximately 37 minutes per participant, with a total of 309 individuals surveyed. However, technical issues result in the inability to retrieve data from 7 participants. Subsequently, two additional responses are dropped due to missing values during the merging process, a common practice in research (Hong et al., 2023), resulting in a final sample size of 300 for data analysis.

⁶ We use [SJR : Scientific Journal Rankings \(scimagojr.com\)](https://scimagojr.com) and [Journal Citation Reports - Journals \(clarivate.com\)](https://clarivate.com) to assess the impact factor.

3.1 Background and study design

The survey is designed by a group of researchers from the Philipps-Universität Marburg, which is conducted in Dhaka, the capital of Bangladesh. For this study we specifically select Dhaka due to its inhabitants primarily being internal migrants, driven by various reasons including climate change (Petrova, 2021) as shown in Figure 1, better job and income opportunities (Hossain, 2013). Moreover Dhaka- located in one of the largest river systems in the world, is the most vulnerable city in Asia (Ahmed, Nahiduzzaman & Hasan, 2018). However, McMichael (2023) highlights that climate is seldom pointed out to be the main reason for migration, even among migrants originating from highly vulnerable areas. Rather the associated effects of climate, such as reduced habitability of place, serve as the primary drivers for migration decisions (McMichael, 2023). The survey sample is drawn from the lower income strata, as they are the most susceptible and likely to bear the brunt of climate-related hazards (Rigaud et al., 2018). The interviews elicit firsthand experiences and felt realities of participants in relation to climate-change induced hazards, akin to the approach of Anshuka et al. (2021).

Figure 1. Internal migration pattern for Natural Hazard-Related Migration



The left side of the figure shows the districts of origin, while the right side depicts the destination districts for natural hazard related migrants, represented in percentage. Source: Petrova, 2021, p. 7.

3.2 Data collection process

The data collection is administered by a team of surveyors, rather than a self-administered survey, as it is said to be the more effective method (Hanemann, 1994). The data is collected using smartphones and tablet computers, with the help of the survey application – KoboCollect⁷, an application that is used by The World Bank, Harvard Humanitarian Initiative, UNHCR and so on. With the help of the survey application, we randomly assign the interviewee to either *Treatment* or *Control* groups with a probability of 50% each.

Nine surveyors, including one of the researchers from Philipps University of Marburg, participate in a training session aimed at standardizing interview techniques. The training places particular emphasis to avoid Experimenter Demand Effects (EDE), in order to ensure validity and reliability of the research findings (Rosenthal & Rosnow, 2008). Seven out of the nine individuals who receive training ultimately assume the role of surveyors for this study. These surveyors receive continuous feedback and supervision throughout the duration of the survey.

Since pre-registering a study makes the research transparent thereby improving credibility (Lin & Green, 2016), this study is Pre-registered⁸ at the Wharton Credibility Lab, University of Pennsylvania, prior to initiating the survey and the pretest phases. Pretest is known to enhance content validity, and through it, the survey (questionnaire) may be better formulated (Brown & Boyle, 2017; Johnston et al., 2017). Pretest is carried out in multiple phases starting in January 2022, and iteratively revised multiple times, as done in studies like Arias-Arévalo et al. (2017) . Employing a cross-sectional approach, the (main) data collection commences on 11.02.2022, following satisfactory outcomes from the updated and pretested questionnaire. Moreover, we exclude respondents who we think are not confident in their answers, a technique also adopted by Uehara, Sakurai, and Tsuge (2020), to uphold content validity.

⁷ KoboCollect is an open-source application used for primary data collection. More information is available in the official website: <https://www.kobotoolbox.org/>

⁸ The preregistration number is 87778 (https://aspredicted.org/NOH_NK4).

3.3 Sampling

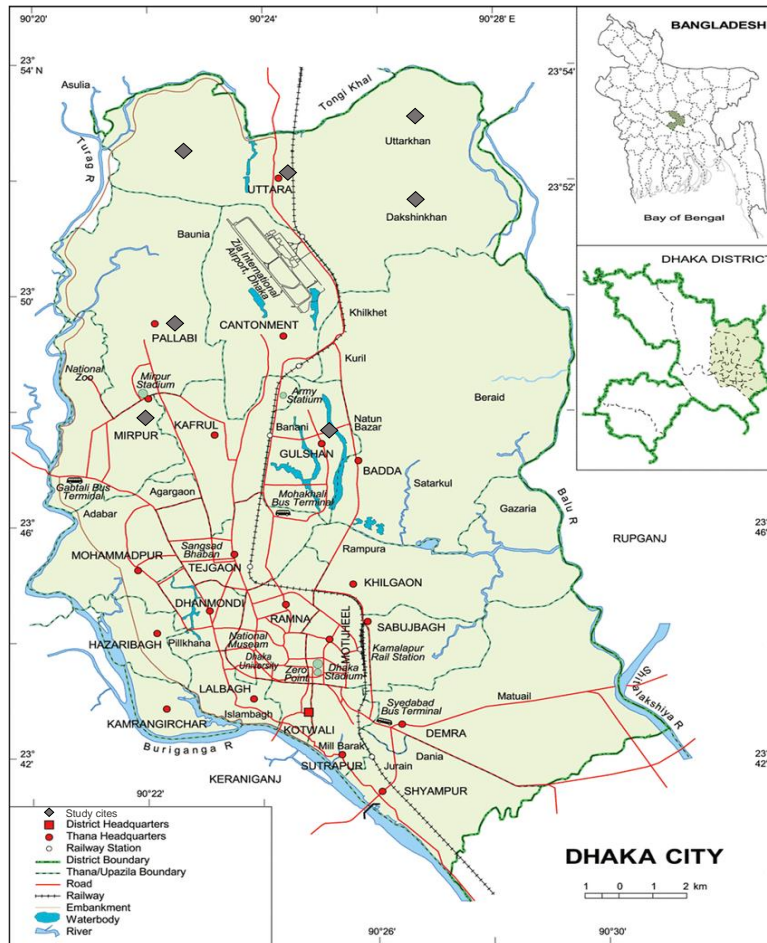
The survey primarily employs a random sampling technique. The selection of study areas encompasses settlements, such as slums, which align with the predetermined strata, i.e. the poor internal immigrants. Table 2 and Figure 2 illustrates the selected survey locations. Due to the large number of settlements in Uttara and Pakuria, the majority of data collection occurs in these areas.

Table 2. Survey location and respondent count

Survey places	Number of respondents
Uttara	159
Pakuria	52
Pallabi	25
Mirpur	22
Banani	19
Dhakshinkhan	11
Uttarkhan	4
Others	8

We aim to conduct the survey near to or at the homes of the respondents or in familiar settings where they are comfortable, conducive to thoughtful reflection on presented questions/scenarios, as recommended by Hanemann (1994). A clear indication of achieving this objective is observed when respondents willingly delve (deeper) into intricate details of their lived experiences, occasionally accompanied by emotional expressions, such as crying. Yates et al. (2021) elucidate that tears and nostalgia observed among respondents serve as manifestations or indicators of the connectedness to the land (that they have departed from).

Figure 2. Map showing the study locations.



Adapted from: Swapan, Zaman, Ahsan, and Ahmed, (2017)

Additionally, many respondents express gratitude towards the surveyors (repeatedly) for taking the time to listen to their stories, and many even refer the survey team to their neighbours, thereby fostering increased acceptance and cooperation throughout the survey process. This aspect is crucial as the team of surveyors encounter occasional resistance and annoyance from people, leading to challenges in meeting daily survey targets. The leveraging these referrals, akin to snowball sampling technique (Parker, Scott, & Geddes, 2019), facilitates the survey process and helps overcome potential barriers. However, it must be kept in mind that the snowball technique is also criticized for moving away from random selection of respondents and that the referral process often leads to selection bias (Oregon State University, 2012; Parker, Scott, & Geddes, 2019).

Given the timing of the survey, which predominantly takes place during daytime, the composition of the sample skews towards females. This disparity arises from the fact that male household

members are often away for work-related reasons during daylight hours. Specifically, approximately 65% of the respondents included in this survey are female. To address this gender imbalance, we also conduct survey during evening hours and/or at roadside tea-stalls and vendors, which are frequented by regular customers such as car and rickshaw drivers, day laborers and so on (Husain, Yasmin, & Islam, 2015), which also aligns with the recommendation of Hanemann (1994), i.e. to take the survey where the respondents are comfortable.

3.4 Survey Materials and Techniques

The survey is designed in an easy-to-understand language, and is made available in both English and Bengali, to facilitate effective communication with the participants like that used by Anshuka et al. (2021) and numerous other studies. The materials are retranslated to English along with the answers, for validation and interpretation, in line with the methodology proposed by Steimanis and Vollan (2022). The currency used in this study is Taka (or TK), the Bangladeshi currency. At the time of the survey the exchange rate stands at 101.51 Taka for one Euro. At the beginning of the survey, participants are briefed about the purpose of the survey and are asked for their consent, adhering to the widely followed guidelines outlined by Johnston et al. (2017). Additionally, the respondents are informed about the compensation/payouts that are available to them for their participation. As an incentive for participation, each respondent is offered a payment of 100 Taka, along with the opportunity to receive an additional payout of another 100 Taka through a lottery system (hence to be referred to as *lottery* hereon), that is distributed at a later time. This lottery system has an element of *dictator game* to it, as explained in the subsequent subsection.

3.4.1 Structure of survey questionnaire

The questionnaire consists of 9 modules/sections. The first module makes sure that the respondents are willing and suitable to take part in the survey (i.e., by age and place of residence). The minimum age requirement of the respondents is set at 18, in accordance to the legal definition of adulthood (i.e. age of majority) in Bangladesh (Legal Information Institute, 2023). The mean age of the respondents in the sample is approximately 39 years. As for the place of residence, only the residents of Dhaka are limited to take part in the survey, for reasons already stated. The first module sets the context of the survey to facilitate better understanding and informed decision making as suggested by Carson (2000). The participants are assured that the responses are going

to remain anonymous, in order to reduce biases like social desirability bias, which is common in self-reported surveys (Steimanis & Vollan, 2022).

The second module of the survey addresses climate change perceptions. The majority of the respondents express their belief that climate change related hazards are going to increase in both frequency and intensity in the future.

For the next module of the survey, the interviewees receive information based on the group they fall under (treatment or control) as mentioned previously. Both groups will receive information regarding the current state of climate change and its ramifications along with the conservation strategies. The communication is buttressed with text content as well as visual aids such as pictures, tables and charts, following the approach advocated by O'Neill and Smith (2014) to enhance comprehension. Additionally, the treatment group will be exposed to specific wordings and visuals intended to evoke relational values among respondents. As explained in the literature review section of this paper, visual priming, enables the direct communication of diverse (environmental) settings, facilitating the examination of the influence of both negative and positive frames on individual behavior (Bimonte et al., 2020).

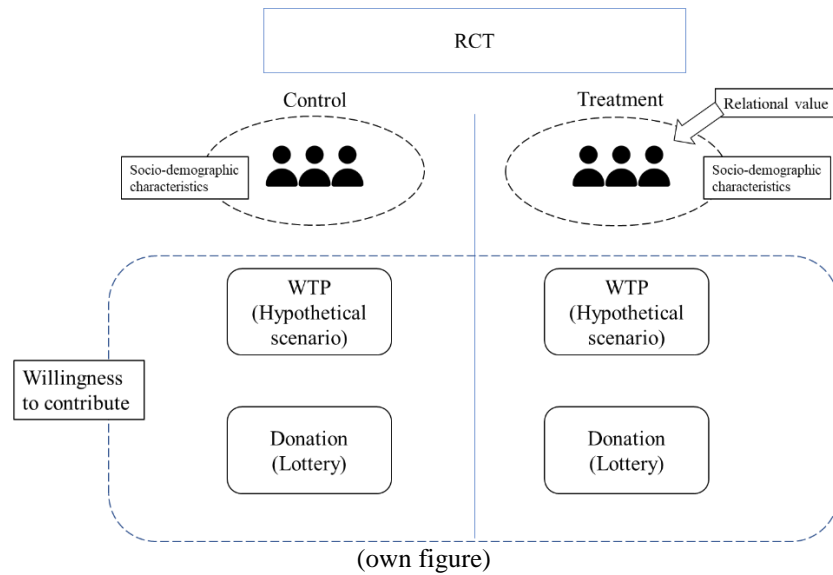
The contingent valuation (CV) method is employed to measure respondents' willingness-to-contribute towards the continuation of policies in increasing the resilience of communities living in low elevation coastal zones (LECZ) in Bangladesh, as well as mitigating the degradation of freshwater resources. As explained in the literature review, CV is a method of economic valuation of natural resources based on the concept of individual utility maximization and economic value, and it is widely used in welfare economics (Ferreira & Marques, 2015). The activity profile of the conservation policy is articulated in an easily understandable manner, drawing from activities within the *Adaptation Initiative for Climate Vulnerable Offshore Small Islands and Riverine Charland* (AICVOSIRC) in Bangladesh by the *Adaptation Fund*⁹. Programs like AICVOSIRC support communities in building and maintaining water tanks and reservoirs, promoting household rainwater harvesting, as well as constructing flood-resistant infrastructure. Additionally, they facilitate communities in learning to use the available water resources more sustainably.

⁹ The Adaptation fund, established under the Kyoto Protocol of the United Nations Framework Convention on Climate Change, finances projects that help vulnerable communities in developing countries. More information is available at the website: <https://www.adaptation-fund.org>

All participants are shown images of flooded low-lying rural lands of Bangladesh, accompanied by a map illustrating the zones vulnerable to climate change induced problems like sea level rise. With the help of verbal and visual cues, we explain how the sea level rise can be hazardous, not only for soil quality and soil erosion but also as a threat to the communities' freshwater security overall. The respondents are explained that AICVOSIRC directly and indirectly benefits 350,000 individuals in its operational areas, with a budget allocation of USD 9.21 Million (800 million Taka). Images of water tanks and reservoirs are displayed to enhance the understanding of the projects' contributions. In order to prime relational value aspects, the treatment group are apprised that if no immediate action is taken, the damage to the ecosystem will make it difficult for the inhabitants to cope on their own. Furthermore, we show images of graves to the treatment group and tell them that due to soil erosion, the inhabitants will have to migrate away from the place and their ancestral ties such as the graves of their forefathers may be eroded by the rivers and the seas. This loss of established social connections, and the inability to return to ancestral homes (of the affected people) may lead to losing a part of their identity. Additionally, the treatment group is shown pictures of people leaving (migrating). After mentioning how social ties may be lost if conservation steps are not taken (adequately), an image of children playing football is also shown and to the treatment group, in an attempt to make connections how the children may lose out their way of living.

We inform the participants that given the budget constraint of the government, a follow up program to AICVOSIRC will be difficult, especially since the budget for the follow-up programme would be higher due to the ever-increasing number of vulnerable people. It has been time and again proven that social support is often crucial (Attanasio et al., 2012) as communities rely on formal and informal risk sharing, coping and reconstruction (Steimanis & Vollan, 2022). Hence, if every individual in Dhaka (i.e., the location of this survey) are to make a one-time contribution of 500 Taka, then a follow-up programme to AICVOSIRC is possible soon, which we name to be *Disaster Zone Protection Fund*. We then prompt the willingness to pay (WTP) questions to the respondents. We made sure that the respondents understand that the WTP amount is a hypothetical one.

Figure 3. Design of this study.



Survey participants are automatically allocated to either of treatment or control groups through the survey tool, KoboCollect. The treatment group is primed with prompts emphasizing relation to ancestral and affected lands, to trigger *Relational value*.

Our main hypothesis posits that incorporating relational value-specific information into the contingent valuation scenario results in an increase in the average WTP for a hypothetical conservation cause. This hypothesis is also applied to the donation exercise, where we carry out a dictator game. Although the donation exercise (with the element of dictator game) is the last module of the survey, we explain it here for better comprehension by readers.

The participants are informed that in addition to the participation fees, 100 individuals out of the total survey respondents will receive an additional amount of 100 Taka, the selection of which is done via a lottery. Each respondent is given an option to donate a portion or the entirety of the lottery amount (100 Taka), should they receive it, to a project overseen by a Non-Governmental Organization (NGO) aiding victims of climate change, similar to the scenario presented in the survey. Lottery winners will receive the rest of the amount that is not donated, either via mobile phone credit or through a mobile financial service like bKash¹⁰.

¹⁰ bKash is a mobile financial service (MFS) in Bangladesh. A bKash account is a virtual wallet, where the phone number acts as the account number. More information is available at <https://www.bkash.com/en>

$$\text{Lottery Take Home Pay} = 100 \text{ Taka} - \text{Donation amount} \quad (\text{a})$$

$$\text{Total Take home pay} = \text{Participation fees} + \beta (\text{Lottery take home pay}) \quad (\text{b})$$

Equation (a) explains the proportion of the lottery winnings retained by a participant in the event of being randomly selected. Equation (b) illustrates the overall take-home pay, comprising the 100 Taka participation fees and the lottery take-home pay. The coefficient β in equation (b) is binary, representing 1 if the individual is randomly selected and 0 if not.

To minimize potential experimental demand effects, participants are not directly asked about the amount they are willing to contribute from the lottery amount. Instead, each participant is provided a slip (see Figure 4) and an envelope and instructed to privately indicate the amount they wish to donate (without disclosing it to the surveyor). Participants are then instructed to seal the slip within the envelope before returning it to the surveyor.

Figure 4. Slip (English version) that is presented to the respondents to indicate the desired donation amount.

Sl.no _____

Please circle the amount you wish to donate. The remaining amount will be given to you through Bkash or Mobile Recharge.

0	5	10	15	20	25	30	35	40	45	50
55	60	65	70	75	80	85	90	95	100	

(own figure)

Marking 0, for example, indicates that the participant has chosen not to donate any amount, entitling them to receive the full 100 Taka payout, in the event that they were randomly selected in the lottery. Following the recommendation of Brown & Boyle(2017), the option of not contributing is available in both the hypothetical WTP scenario and in the donation exercise.

Continuing the description of the survey modules, the fourth module focuses on capturing the lived experiences of natural hazards and the adaptation measures undertaken by the respondents. The subsequent short modules are about migration decisions, ability and preference followed by norms. The seventh module aims to gather information about the economic situation and agency of the

respondents along with their personality and preferences. Additionally, we seek to assess their propensity for risk-taking, trust, reciprocity and stated altruism. The eighth module aims to understand the socio-demographic characteristics of the surveyed sample. The final module deals with the lottery (as already explained). The questionnaire including pictures, figures and tables that are presented (to both control and treatment groups) are available in the Annex (link given in Appendix A1).

3.4.2 Strategic consideration for questionnaire design

To provide deeper insights into this study, we deem it necessary to delve into the third module of the survey (see Appendix A1), that elicits respondents' WTP and RV, as well as the final module, the donation scenario (with dictator game element). It is pertinent to note that according to Arrow et al. (1993), respondents tend to state hypothetical WTP amounts that are often, if not always, higher than actual payment amounts. This variance between the hypothetical and actual payments is termed as *hypothetical bias* (Murphy et al., 2005; Blumenschein et al., 2008). Murphy et al. (2005) and Harrison and Rutström (2008) find in their meta-analyses that the hypothetical bias tends to be positive and upward in most cases (i.e. overstatement of WTP). To mitigate the ex-ante hypothetical bias, we use a chart (Figure 5) to remind participants of their budget constraints and the opportunity costs of the donation. This chart illustrates the goods they would forgo for the (hypothetical) payment to the conservation cause, a technique drawn from Blomquist, Blumenschein, & Johannesson (2009). Additionally, we prompt the participants to explain their reasons for their wtp decision, even if they opted not to pay (i.e., 0 wtp).

Figure 5. The chart (English version) depicting the opportunity costs associated with different wtp amounts.

Payment Card	
One-time payment today (in BDT)	
0	
20	
40	
60	<i>1 Kg Rice</i>
80	
100	
120	<i>1 kg Lentil (Daal)</i>
140	
160	
180	
200	<i>1 Liter Mustard oil</i>
250	
300	<i>400g Powder Milk</i>
350	
400	<i>1 kg Rui Fish</i>
450	
500	<i>400 g Butter oil</i>
600	
700	<i>1 kg Barbel (Shing) Fish</i>
800	
more than the amounts on the card	

(own figure)

In order to assess the impact of priming RVs, we ask the respondents to indicate their level of agreement with value statements including instrumental, intrinsic and relational values, as adapted from Klain et al. (2017). We use 5-point Likert scale, ranging from 1 for ‘Completely disagree’ to 5 for ‘Completely agree’. We conjecture that the treatment group will exhibit higher relational values. Furthermore, we expect the donation intention of the treatment group to surpass that of the control group and therefore the hypothetical bias to be lower for the treatment group, if present.

To understand the respondents’ perspectives on the environment and its conservation, we present the participants with intrinsic value and instrumental value related scenarios. Participants are then asked to rank four statements based on the importance they assign to each statement. To facilitate

the respondents in ranking the options, cut-out slips containing the available options are provided. This method is introduced after the pre-test, which reveals that ranking the options are challenging for the respondents. The use of cut-out slips or cards (with different options) for ranking questions is a practical and widely used technique in surveys that elicit respondents' preferences and rankings. This flexibility to physically manipulate and arrange the slips according to the respondent's preferences, facilitates a more nuanced understanding of their ranking choices (Cataldo et al., 1970). By providing respondents with cut-out slips (with the available options), interviewees are able to take their time to arrange (i.e., rank) the options, resulting in higher quality responses. According to Cataldo et al. (1970), this technique can enhance the validity and reliability of data collection.

We also ask the respondents about the different ways the new fund (Disaster Zone Protection Fund) may be used to help the vulnerable. However, there is consensus among surveyors that the majority of respondents, in both treatment and control groups, misconstrue this inquiry. Therefore, we opt to exclude this question from our analysis. Hong et al. (2023) note that many studies lack transparency regarding the preprocessing steps of their data. To ensure clarity, we explicitly declare this exclusionary step, thus aiming to maintain transparency in our research process.

3.5 Proximity of home village to waterbodies: a proxy to risk prone areas

Bangladesh is a low-lying deltaic country (Chowdhury, 2022), with over 230 rivers, thousands of canals as well as vast waterways (Alam et al., 2020). Given the susceptibility of coastal and riverine regions to climate-induced hazards, such as river erosion, flooding, waterlogging and such forth (Alam et al., 2020; Nicholls et al., 2021), we use the proximity to waterbodies as proxies for areas at risk of *water-related risks*. We postulate that the proximity (and likelihood of water related affect), influences the results, namely the contingent valuations (WTP and donation) of the respondents. To the best of our knowledge, this study is the first to investigate this relationship. Kleespies & Dierkes (2020) state that people adversely affected by climate-induced hazards are likely to act in a more environmentally friendly way. We extrapolate from this notion to see if this also leads to higher conservation choices i.e., higher WTP and donation intention in this study.

Steps to determine distance

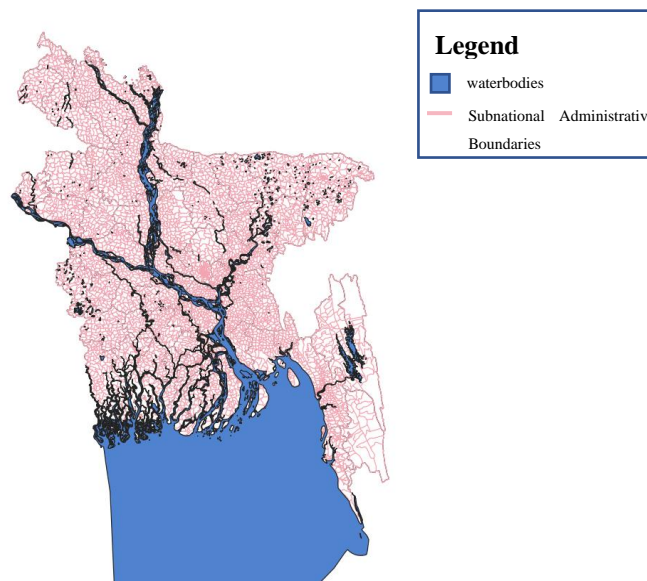
To find the proximity, we take the midpoint of the village and calculate the distance to the nearest significant waterbody, including the sea, rivers, lakes and (relatively) big tributaries.

The steps that we follow are:

Step 1. Standardization/homogenization of village data: The initial step involves correcting and homogenizing village names due to variations in spelling. We primarily use Google maps for this step. In instances where a village is not listed in Google maps, standardization relies on local knowledge or references to the district center (known as *Sadar*).

Step 2. Data acquisition: Data is sourced from the Humanitarian Data Exchange (HDX) provided by the Office for the Coordination of Humanitarian Affairs (OCHA) Regional office for Asia and the Pacific (ROAP). The datasets acquired include: a) Subnational Administrative Boundaries ¹¹ and b) Waterbodies ^{12 13 14}.

Figure 6. Map of Bangladesh including Subnational Administrative boundaries and Waterbodies.



The figure shows the merged version of the map, where pink lines are used to denote the Subnational Administrative Boundaries (administration level 4 to be the closest proxy to village boundaries) and blue denotes the waterbodies. Source: Own creation using data from publicly available databases ^{11,12,13,14} in QGIS.

¹¹ <https://data.humdata.org/dataset/cod-ab-bgd>

¹² <https://data.humdata.org/dataset/bangladesh-water-courses>

¹³ https://gadm.org/download_country.html

¹⁴ <https://www.marineregions.org/gazetteer.php?p=details&id=25431>

The above-mentioned repository is chosen due to its number of data points available being the closest to the number of villages in Bangladesh. We utilize data from Administration Level 4, the lowest administrative unit of the government. The data in this repository is updated annually, ensuring that the information is up to date.

For the waterbodies, we source the dataset from the Local Government Engineering Department (LGED)¹⁵, that is updated annually by World Food Programme (WFP), Map Action, and OCHA. We merge this data with that provided by GADM¹⁶ and with the sea data from Marineregions.org for precise accurate representation of existing waterbodies.

Step 3. We attach the coordinates from the repository to our primary collected data (from survey) and calculate the distance to the closest waterbody.

Data integration and calculations are done using QGIS software. The NNJoin Package in QGIS is used for the distance calculation, providing output in degrees, which are then converted to kilometers by multiplying the output by 111.32, as suggested by Rosenberg (2020).

The next section analyses the data that is collected as explained thus far. Before we move on to see the results, here is a summary of the main hypotheses for this study:

1. Relational Values Priming:

$$H_1: RV_{\text{Treatment}} > RV_{\text{Control}}$$

2. Influence of Relational Value Priming on Willingness-to-Pay (WTP):

$$H_2: WTP_{\text{Treatment}} > WTP_{\text{Control}}$$

3. Influence of Relational Value Priming on Donation:

$$H_3: \text{Donation}_{\text{Treatment}} > \text{Donation}_{\text{Control}}$$

4. Influence of Proximity to Waterbodies on WTP:

$$H_4: WTP_{\text{Water close}} > WTP_{\text{Water far}}$$

5. Influence of Proximity to Waterbodies on Donation:

$$H_5: \text{Donation}_{\text{Water close}} > \text{Donation}_{\text{Water far}}$$

6. Hypothetical bias (if any):

$$H_6: \text{Hypothetical bias}_{\text{Treatment}} > \text{Hypothetical bias}_{\text{Control}}$$

¹⁵ <http://oldweb.lged.gov.bd/>

¹⁶ <https://gadm.org/>

4. Results and discussions

4.1 Results

This section presents the empirical analysis of the survey data. Table 3 presents the summary statistic and description of the variables that are the most relevant for our study. The variable names correspond to those used in the statistical analysis. This table provides a brief explanation along with the mean, median and standard deviation (SD) for each variable.

Table 3. Summary statistic and description

Variable name(s)	Type	Explanation	Mean	Median	SD
wtp	Continuous	Willingness to pay in Taka.	144.53	60	214.67
treatment	Binary	Treatment variable. 0 is assigned to the control group and 1 is assigned to the treatment.	0.56	1	0.50
relational_v1			3.86	5	1.45
relational_v2	relational_v* are all Categorical Variables	5-point Likert Scale questions to elicit (dis)agreement with these statements.	4.23	5	1.25
relational_v3			3.51	4	1.64
relational_v4			4.27	5	1.25
relval	Continuous	PCA of relational_v1, relational_v2, relational_v3, relational_v4.	1.89E-09	0.21	1.23
age	Continuous	Age of the respondent. Minimum age to qualify as a respondent is 18 years.	39.96	36	14.24
female	Binary	Gender variable. 0=Male and 1=female.	0.64	1	0.48

marital	Categorical Variable	The marital status variable consists of six categories represented by numerical codes as follows: 1 -Never married, 2-Currently married, 3-Widowed, 4- Divorced, 5-Abandoned / Separated and 6-Others.	2.48	2	1.47
edu_yr	Continuous	Number of years spent on education.	3.5	0	4.25
household_income	Categorical Variable	Monthly household income.	10613.33	7500	5955.42
distance	Continuous	Distance from place of origin to the nearest (major) waterbody (in Kilometers).	7.93	7.48	5.85
donation	Continuous	Donation amount (declared) in Taka.	35.92	20	30.77
wtp100	Continuous	Willingness to pay amount bounded till 100 Taka.	58.23	60	39.09
hypothetical_bias	Continuous	Hypothetical bias = wtp100 – donation (Amount is given in Taka)	22.5	17.5	45.68

Willingness to Pay (WTP) is used interchangeably with wtp, consistent with the variable name used in our statistical analysis, and serves as our main dependent variable. Following the analytical approach of Bamwesigye et al. (2020), we find that the mean WTP is around 145 Taka (see Table 3). Around 20% of the control group and approximately 25% of the treatment group (comprising about 23% of the total surveyed) express a willingness to pay this amount or more. To deepen the analysis, we use multivariate least squares regression to explore the potential impact of the treatment on WTP, as detailed in the *Methodology* section of this paper. Throughout the regression analyses, we apply robust standard errors using Eicker–Huber–White heteroskedasticity correction method to address heteroscedasticity and thereby minimize the risk of type I error (Cribari-Neto & Lima, 2014; White, 1982).

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \epsilon_{i1} \quad (1)$$

Equation (1) presents the baseline model, wherein the treatment dummy variable serves as the independent variable.

Table 4. Impact of the treatment variable on wtp.

wtp	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]
treatment	32.487	23.966	1.36	.176	-14.68	79.650
Constant	126.316	14.730	8.58	0***	97.327	155.305
Mean dependent var		144.537	SD dependent var			214.674
R-squared		0.006	Number of obs.			300
F-test		1.836	Prob > F			0.176

This table shows the regression outcomes of Equation (1), with wtp as the dependent variable, and treatment as the independent variable. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

The regression reveals a positive relation between them, indicating that the treatment group exhibits a tendency to pay more than that of control group. However, the results are not statistically significant. Merely conducting a regression analysis on WTP, and controlling for treatment variable proves insufficient. To understand the relational values that the respondents conform to, we administer a set of 5-point Likert scale questions (where 5= strong agreement and 1= strong disagreement with each statement), that were used by Klain et al. (2017). Overall, the majority of respondents express strong agreement with the relational value statements (refer to Table 5). These relational value statements may be used to check the individual and cultural identity, moral and social responsibility and stewardship principles (Klain et al., 2017; Uehara et al., 2020). Drawing from the study of Pratson, Adams and Gould (2023), our study grazes upon categories of RV encompassing individual identity, responsibility and sense of place. Our conjecture, as outlined in the methodology section, that the treatment group would have higher scores for the RV statements on average. Although the mean of the total from the relational value statements are higher for the treatment group compared to the control group, we explore this further near the end of the section, before coming to a verdict as to whether the conjecture is fulfilled (refer to Equation 11 – 13).

Table 5. (Dis)Agreement with Relational value statements

5-point Likert Scale	relational_v1 There are landscapes that say something about who we are as a person.	relational_v2 I have strong feelings about nature (including plants, animals, the land, etc.), these views are part of who I am and how I live my life.	relational_v3 I often think of some wild places whose fate I care about and strive to protect, even though I may never see them myself.	relational_v4 Humans have a responsibility to account for our own impacts to the environment because they can harm other people.
5. Strongly agree	161	191	133	198
4. Agree	30	50	47	47
3. Neither agree nor disagree	59	22	33	20
2. Disagree	7	13	15	9
1. Strongly disagree	43	24	72	26

In order to see whether our hypothesis of a higher WTP on average for the treatment group, we control for the relational values as well. However, the individual RV variables do not yield significant results. Consequently, we consolidate the relational value variables using Principal Component Analysis (PCA), following the approach of Dunlap et al. (2000) on the revised New Environmental Paradigm (NEP) Scale¹⁷. PCA is a technique for reducing or consolidating dimensions, increasing interpretability and minimizing information loss (Jolliffe & Cadima, 2016). After calculating the eigenvalues and plotting scree test, we determine the components to include in our analysis. It is common to retain components with eigenvalues ≥ 1 , and parallelly using the scree plot (see Appendix A2, Figure 7) to identify the component after which the slope of the curve changes abruptly (Karlis, Saporta, & Spinakis, 2003). In our analysis, we retain only one component, which we name “relval”. Subsequently, we regress the dependent variable (wtp), controlling for the treatment variable and *relval*, as shown in equation (2). Here again our results are at odd with the initial hypothesis.

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \beta_2 relval_i + \mathcal{E}_{i1} \quad (2)$$

Although the results are not significant, we cannot entirely dismiss the treatment effects. It is plausible that since the respondents may have pre-existing lived experiences, that we wanted to make salient of for the treatment group, thereby diminishing the overall difference between the control and the treatment. Consequently, we proceed to control for the sociodemographic

¹⁷ The New Environmental Paradigm (NEP) Scale by Dunlap and Van Liere, published in 1978, is widely used method of eliciting respondents’ (dis)agreement with some statements to measure beliefs about nature (Klain et al., 2017).

characteristics that may influence the WTP, drawing on the methodologies of Bamwesigye et al. (2020) and Steimanis et al. (2021). Due to its lack of substantial contribution to the outcomes, RV (*relval*) is omitted from the model. Nevertheless, we intend to check in a subsequent part of the paper whether the treatment and the sociodemographic variables have an impact on the relational values (*relval*).

As for the ranking question, as explained in the methodology section, considerable effort is exerted to ensure that the ranking questions are easily comprehensible for the respondents. However, we acknowledge that various factors, such as participants' differing education levels, the survey conditions and so on, may influence the clarity and accuracy of response to this question. Therefore, we refrain from an in-depth analysis of this question. A brief summary for this, without delving deep, indicates that instrumental value is ranked the most important followed by relational value and then intrinsic value.

An interesting finding is that when solely regressing WTP as the dependent variable and controlling for the treatment variable and gender (*female*), only the gender variable exhibits significant result at 10% level (refer to Table 6). The coefficient for the gender variable (*female*) is -51.75. This means that female respondents are on average likely to have a lower WTP by 51.75 Taka compared to their male counterparts. Upon further control for age, only the gender variable remains significant 10% level and the coefficient is -50.35, i.e., female respondents are on average likely to have lower WTP by 50.35 Taka than the male counterparts. However, with the addition of other sociodemographic characteristics, even though the negative relation with WTP persists, the statistical significance of the gender variable diminishes.

We incorporate age, marital status, education level and income, to control for the sociodemographic characteristics. Despite the rationale for including both individual and household income in the model, their simultaneous inclusion leads to a substantial degree of collinearity. This issue persists even with the introduction of interaction terms. Since the options to answer about occupation includes, among other things, being unemployed or engaged in homemaking activities as a housewife/husband, we opt to include household income level as a better measure and to mitigate multicollinearity, thereby omitting the individual income variable from the model. Subsequently, we check the Variance Inflation Factor (VIF) as a diagnostic measure, to ensure the avoidance of multicollinearity and maintain the integrity of the analysis

(Thompson et al., 2017). The model incorporates control for individual (sociodemographic) characteristics, including gender, age, marital status, years of education, and household income level, in light with previous studies¹⁸. After accounting for these sociodemographic variables, we come to the following model:

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \mathcal{E}_{il} \quad (3a)$$

which we shorten to:

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \sum_{j=2}^6 \beta_j Individual\ controls_i + \mathcal{E}_{il} \quad (3b)$$

After controlling for these sociodemographic characteristics, we observe that the treatment variable becomes significant at the 10% level. This suggests that there previously was unobserved heterogeneity that, once controlled for, reveal a significant result for the treatment variable. Moreover, household income positively impacts the WTP and is highly statistically significant at 1% level. Furthermore, we conduct a Mann-Whitney U test is done, following Arias-Arévalo et al. (2017), to see if there are differences between the control and treatment respondents' sociodemographic characteristics and we find no significant difference therein.

Naturally, it is impossible to account for every reason that influence an individual's willingness to pay, and many variables remain unmeasured in this survey. One such factor could be the respondents' previous (lived) experience with floods, (salt) water intrusion, soil erosion and other hazards due to their proximity to waterbodies (such as sea, rivers and lakes), which could lead to a heterogenous treatment effect (Garrido et al., 2016; Wager & Athey, 2018). As explained in the methodology section, we take distance from the respondents' villages (place of origin) to the nearest waterbodies as a proxy for proximity to risk-prone areas, aiming to control for intrinsic treatment effects. To the best of our knowledge, this study is the first to include distance from waterbodies (as a proxy to disaster-prone areas) to assess its impact on the willingness to pay.

¹⁸ A non-exhaustive list of studies that include socioeconomic variables are Bamwesigye et al. (2020), Steimanis et al. (2021), Arias-Arévalo et al. (2017), and so on.

Hence, we extend our simple model to include the distance variable (from the waterbodies) as depicted in equations 4a and 4b.

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \beta_7 distance_i + \varepsilon_{i1} \quad (4a)$$

Equation 4a can be shortened to:

$$wtp_i = \alpha_1 + \beta_1 treatment_i + \sum_{j=2}^6 \beta_j Individual\ controls_i + \beta_7 distance + \varepsilon_{i1} \quad (4b)$$

Table 6. Regression of wtp controlling for sociodemographic characteristics and distance from waterbodies

	Dependent variable: wtp				
	(1)	(2)	(3)	(4)	(5)
treatment	32.49 (23.97)	33.97 (23.80)	35.23 (23.98)	41.36* (24.22)	40.75* (24.13)
female		-51.75* (27.02)	-50.35* (27.21)	-19.05 (31.33)	-26.16 (30.21)
age			0.475 (0.940)	0.895 (1.082)	0.848 (1.076)
marital				-3.882 (8.687)	-4.486 (8.532)
edu_yr				0.795 (3.411)	1.062 (3.411)
household_income				0.00610*** (0.00233)	0.00589** (0.00230)
distance					3.228* (1.837)
Constant	126.3*** (14.73)	158.6*** (24.40)	138.0*** (46.35)	39.97 (70.85)	23.89 (79.54)
Observations	300	300	300	300	300
R-squared	0.006	0.019	0.020	0.048	0.055
Adjusted R2	0.0324	0.0324	0.0324	0.0324	0.0324

This table present the results from equation (1) to equation (4). The explanations of these variables are available in Table 3. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

We find that controlling for distance significantly contributes to our model. The treatment group exhibits, on average, a higher WTP by 40.75 Taka compared to the control group, significant at 10% level. This suggests that making relational value aspects salient to the treatment group yields

higher WTP for the hypothetical conservation scenario/project. On the other hand, higher household income corresponds to a higher WTP for conservation. A rise in household income by TK 1000 results in an increase in WTP by an average of 5.89 Taka, which is statistically significant at 5% level. Notably, distance from waterbodies also yields significant results at the 5% level. An increase in distance by 1 kilometer increases the WTP by 3.23 Taka on average. This is contrary to our intuition that people who formerly lived closer to waterbodies might exhibit more empathy towards conservation and thereby exhibit higher WTP. It is also mentionable that trauma typically triggers a wide range of behavioral responses. Some individuals may react by holding back on financial activities, including charitable giving, while others may express heightened generosity driven by feelings of empathy and solidarity (Berrebi et al., 2021).

To gain a deeper understanding of the WTP decision, we categorize the WTP into four distinct groups, including a group representing zero WTP, and conduct an ordered logistic regression (ologit). We also include an interaction term between distance and the treatment variable.

$$wtp_category_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \beta_7 distance_i + \beta_8 (treatment \times distance)_i + \epsilon_{i1} \quad (5a)$$

Equation 5a can be shortened to:

$$wtp_category_i = \alpha_1 + \beta_1 treatment_i + \sum_{j=2}^6 \beta_j Individual\ controls_i + \beta_7 distance_i + \beta_8 (treatment \times distance)_i + \epsilon_{i1} \quad (5b)$$

We find only household income to be significant at the 10% level. Interestingly, we observe a significant negative relation between the treatment group with WTP below 60 Taka and the distance from waterbodies, aligning with our expectations. An increase in distance by 1 km decreases the probability of the *wtp_category*, i.e., decrease in distance to waterbodies increases the probability of the WTP amount (as per category). This implies that individuals who were in close proximity to the waterbodies exhibit higher WTP. However, for treatment groups with WTP exceeding 60 Taka, there exists a significant positive relation to distance from the waterbodies. Further analysis reveals that the mean household income of respondents with WTP higher than 60 Taka is higher than the ones with WTP lower than 60 Taka by approximately 1707 Taka on average. This suggests that unless the household income is significantly higher, people closer to waterbodies are more likely to have higher WTP. It must be noted that the amounts are not

economically significant, as the differences in WTP are very miniscule. For brevity, these results are present in the Appendix section (see A3, Tables 11 – 14).

We conduct Ramsey Regression Equation Specification Error Test (RESET test) to see if our models have omitted variables bias (Leung & Yu, 2000), namely the omitted interaction terms. Based on the Ramsey RESET test results, there seems to be no significant evidence of omitted variables in our models. However, according to Antonakis et al. (2010), the RESET test is more effective at determining whether the dependent variable is linear given the independent variable, rather than being a good test of omitted variables.

As explained in the methodology section, the survey entails a lottery section with an element of a dictator game. Respondents have the option to donate in part or in full, of the lottery amount, to a project overseen by a charitable non-governmental organization (NGO) that aids victims of climate change, similar to the hypothetical scenario and project that is presented to the respondents. The amount that the respondents indicate to be donated are recorded under the variable named “*donation*”. We want to see if the treatment effect reflects in the donation amounts, akin to the analysis conducted for WTP. The mean donation is 35.92 Taka (see Table 3). We observe that around 39.8% of the control group and 41.8% of the treatment group (and around 40% of the total) are willing to donate at least this amount. Our hypothesis posits that the treatment group is likely to contribute a higher donation, on average, compared to the control group.

The baseline equation depicting the relationship between donation and the treatment is as follows:

$$donation_i = \alpha_1 + \beta_1 treatment_i + \varepsilon_{i1} \quad (6)$$

Subsequently we include *relval* into our model:

$$donation_i = \alpha_1 + \beta_1 treatment_i + \beta_2 relval_i + \varepsilon_{i1} \quad (7)$$

However, after testing the outcomes, we decide to exclude *relval* from the subsequent models, as it does not significantly impact the model. We then incorporate the sociodemographic characteristics (see Equation 8) and finally distance (see Equation 9) into our models.

$$donation_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \varepsilon_{i1} \quad (8a)$$

which we shorten to:

$$donation_i = \alpha_1 + \beta_1 treatment_i + \sum_{j=2}^6 \beta_j Individual\ controls_i + \varepsilon_{i1} \quad (8b)$$

$$donation_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \beta_7 distance_i + \varepsilon_{i1} \quad (9a)$$

that we shorten to:

$$donation_i = \alpha_1 + \beta_1 treatment_i + \sum_{j=2}^6 \beta_j Individual\ controls_i + \beta_7 distance_i + \varepsilon_{i1} \quad (9b)$$

Table 7. Regression of donation controlling for sociodemographic characteristics and distance from waterbodies

	Dependent variable: donation				
	(1)	(2)	(3)	(4)	(5)
treatment	0.377 (3.575)	0.838 (3.427)	0.183 (3.424)	0.614 (3.434)	0.597 (3.443)
female		-18.91*** (3.819)	-19.62*** (3.791)	-13.14*** (4.131)	-13.31*** (4.184)
age			-0.233** (0.117)	-0.0565 (0.129)	-0.0577 (0.130)
marital				1.364 (1.107)	1.350 (1.106)
edu_yr				1.462*** (0.486)	1.468*** (0.486)
household_income				0.000826***	0.000821** *
distance				(0.000314)	(0.000315) 0.0770 (0.278)
Constant	35.71*** (2.605)	47.51*** (3.784)	57.64*** (6.231)	28.97*** (9.737)	28.59*** (9.685)
Observations	298	298	298	298	298
R-squared	0.000	0.087	0.099	0.151	0.152
Adjusted R2	0.131	0.131	0.131	0.131	0.131

This table shows the results from equation (6) to equation (9). The explanations of these variables are available in Table 3. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

Table 7 shows the relationship between *donation* (dependent variable) and various independent variables. Due to systematic issues with data extraction, we omit two observations from the regression analysis, resulting in sample size of 298 observations. The baseline model regresses only

the treatment variable against donation (refer to Table 7, Column 1). Subsequently, we include the consolidated RV from PCA (i.e. *relval*), which, due to its lack of value addition, is discarded from subsequent models.

As we proceed to control for sociodemographic characteristics, we find a significant negative relationship between gender and donation, mirroring our findings with WTP. Specifically, female respondents are, on average, likely to donate less than male respondents. After further inclusion of sociodemographic characteristics and distance in the model, we find that the treatment variable does not achieve statistical significance. For a comprehensive comparison, we bring the final models of WTP and donation together in Table 8.

Table 8. Comparing final models of wtp and donation

	wtp	donation
	(1)	(2)
treatment	40.75* (24.13)	0.597 (3.443)
female	-26.16 (30.21)	-13.31*** (4.184)
age	0.848 (1.076)	-0.0577 (0.130)
marital	-4.486 (8.532)	1.350 (1.106)
edu_yr	1.062 (3.411)	1.468*** (0.486)
household_income	0.00589** (0.00230)	0.000821*** (0.000315)
distance	3.228* (1.837)	0.0770 (0.278)
Constant	23.89 (79.54)	28.59*** (9.685)
Observations	300	298
R-squared	0.055	0.152
Adjusted R2	0.0324	0.131

This table shows the results from equations (4) and (9). The explanations of these variables are available in Table 3. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

Upon contrasting the results, we observe that the gender variable (*female*) remains highly significant in the case of donation. Female participants, on average, exhibit a willingness to donate 13.31 Taka less compared to their male counterparts. This finding contradicts several studies, such as those by Vicente-Molina, Fernández-Sainz and Izagirre-Olaizola (2018) and Bimonte, Bosco, and Stabile (2020), where female participants demonstrate significantly higher pro-environmental attitude. However, in the context of Bangladesh, where men are the main breadwinners and decision makers of the household (Kabeer, 2011; Roy et al., 2017; UNDP, 2024), it is understandable that female participants exhibit lower willingness to donate compared to the male counterparts. Our findings reveal that a lower percentage of the female respondents make household decisions independently, which may be a constricting factor behind their donation decision.

Furthermore, the level of education, quantified by the years devoted to educational activities, yields a highly significant influence on donation behavior. Since education is widely considered to be a key element of environmental awareness, higher education levels are expected to foster a more pro-environmental attitude (Bimonte, Bosco, & Stabile, 2020). We find a positive correlation between RV and education, which is also consistent with the findings from the study by Arias-Arévalo et al. (2017). Despite the seemingly modest increase of around 1.47 Taka for each additional year of education, it is imperative to note that respondents are questioned about their willingness to donate from a potential endowment amount (lottery amount) of only 100 Taka. Had the lottery amount been greater, the donation figure might have reflected a higher amount.

We preemptively try to solve the issue of hypothetical with the help of a chart (Figure 5) as explained in the methodology section, to remind participants of their budget constraints and the opportunity costs of the donation. This chart illustrates the goods they would forgo for the (hypothetical) payment to the conservation cause, a technique drawn from Blomquist, Blumenschein, & Johannesson (2009).

The WTP amount, which is a hypothetical amount, range from 0 to 1000 Taka, while the donation amount (from the dictator game) is bounded at 100 Taka. Therefore, we rescale the WTP amount to 100 Taka and call this variable as *wtp100* (refer to Table 3 for details). If the WTP amount is 100 or above, we rescale it to 100 Taka and if it is below 100, it remains unchanged. The (proxy for) hypothetical bias is the difference between *wtp100* and the donation amount (see Table 3).

We then assess whether the hypothetical bias is affected by our treatment of RV aspects, and analyze if the sociodemographic factors play a role in this bias, using a simple model as shown below (Equation 10). Given our expectation, that the donation intention of the treatment group surpasses that of the control group, we expect the hypothetical bias to be lower for the treatment group, if present at all (as expressed in one of our hypotheses).

$$\text{hypothetical_bias}_i = \alpha_1 + \beta_1 \text{treatment}_i + \beta_2 \text{female}_i + \beta_3 \text{Age}_i + \beta_4 \text{marital}_i + \beta_5 \text{edu_yr}_i + \beta_6 \text{household_income}_i + \beta_7 \text{distance}_i + \varepsilon_{i1} \quad (10)$$

Table 9. Effects of treatment and sociodemographic variables on hypothetical bias

hypothetical_bias	Coef.	St.Err.	t-value	p-value	[95% Confidence Interval]
treatment	-6.86	5.207	-1.32	0.189	-17.107 3.388
female	7.716	6.639	1.16	0.246	-5.351 20.783
age	-0.175	.221	-0.79	0.429	-.611 .26
marital	-2.909	1.782	-1.63	0.104	-6.415 .598
edu_yr	-2.043	0.738	-2.77	0.006***	-3.496 -.59
household_income	0.000	0.000	-0.57	0.571	-.001 .001
distance	0.55	0.424	1.30	0.196	-.286 1.385
Constant	41.283	15.575	2.65	0.008	10.628 71.938
Mean dependent var	22.500				SD dependent var 45.677
R-squared	0.065				Number of obs 298
F-test	2.425				Prob > F 0.020

This table shows the results from equation (10). The explanations of these variables are available in Table 3. All of the estimates from the regression are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

It is noteworthy that the education variable (*edu_yr*) is highly significant at the 1% level, indicating that each additional year of education reduces the hypothetical bias by an average of 2.04 Taka. It is mentionable that there is a negative relationship of treatment with *hypothetical bias*, i.e., the treatment group's hypothetical bias is lower than that of the control group by 6.86 Taka. However, due to lack of statistical significance, we cannot lean too much into interpreting the results.

A recent meta-analysis spanning over 23 years (from 1997 to 2020) and encompassing 80 dictator games reveals that, on average, dictators donate 22% of their endowment. Specifically, when the endowment is unearned and the recipient is a charity, as is the case in our study, then the donation amount tends to higher (Umer, Kurosaki, & Iwasaki, 2022). Investigating the applicability of this

finding to our study, we observe that the donation averages for both the treatment and control groups exceed 35% (i.e., 35 Taka). It is notable, however, that instances exist where individuals opt not to make any donation. To delve deeper, we employ the hurdle model, with a lower limit set at 0. To act as hurdles, we take the variables that are significant either for the models related to WTP or with donation, namely gender variable (*female*), education level in years (*edu_yr*) and household income (*household_income*) and distance.

Table 10. Hurdle model to analyze donation

donation	Coefficient	Std. err.	z	p-value	[95%	interval]
treatment	0.986	8.143	0.120	0.904	-14.974	16.946
female	-28.279	10.136	-2.790	0.005***	-48.144	-8.413
age	-0.064	0.310	-0.210	0.836	-0.673	0.544
marital	3.685	3.206	1.150	0.250	-2.599	9.970
edu_yr	2.853	1.024	2.790	0.005***	0.845	4.861
household_income	0.002	0.001	2.440	0.015**	0.000	0.003
distance	0.137	0.716	0.190	0.848	-1.266	1.541
_cons	-12.803	25.615	-0.500	0.617	-63.008	37.403
<hr/>						
selection_ll						
female	-0.322	0.280	-1.150	0.251	-0.872	0.228
edu_yr	0.063	0.033	1.900	0.057*	-0.002	0.129
household_income	0.000	0.000	0.970	0.333	-0.000	0.000
distance	0.008	0.019	0.410	0.683	-0.029	0.044
_cons	1.209	0.374	3.230	0.001***	0.476	1.942
<hr/>						
Insigma						
_cons	3.761	0.102	36.730	0.000***	3.560	3.962
/sigma	42.998	4.402			35.180	52.553
<hr/>						
Number of obs	298					
LR chi2(7)	48.22					
Prob > chi2	0.000					
Log likelihood	-1326.1391					
Pseudo R2	0.0179					

The table shows the Cragg hurdle model, employed to see if donation is impacted by the hurdles. The explanations of these variables are available in Table 3. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

The lower panel of the Cragg hurdle model (Table 10) examines whether the hurdles impact the decision to contribute towards donations. In this analysis, donation is treated as binary, where positive (non-zero) contributions to donations are accounted for. The results indicate that only education level is marginally significant at the 10% level in influencing a positive donation amount.

The top panel presents the main regression (Truncated regression for positive) results of donation, controlling for the treatment variable, the sociodemographic variables, and distance. Here gender and education level are highly significant at the 1% level, and household income is significant at the 5% level. According to the outcomes, each additional year spent in education results in an average increase in donations by approximately 2.85 Taka, while female respondents are, on average, likely to donate approximately 28 Taka less than their male counterparts, which is a considerable amount given the maximum donation amount is bounded by the endowment of 100 Taka. Furthermore, an increase in household income by 1000 Taka will lead to an average increase in donation on average by 2 Taka.

Finally, we investigate whether RV variable (*relval*) is influenced by the treatment, sociodemographic variables, and the distance. We develop simple models (refer to Equation 11 – 13) by stepwise inclusion of variables as follows.

$$relval_i = \alpha_1 + \beta_1 treatment_i + \varepsilon_{i1} \quad (11)$$

$$relval_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \varepsilon_{i1} \quad (12)$$

$$relval_i = \alpha_1 + \beta_1 treatment_i + \beta_2 female_i + \beta_3 age_i + \beta_4 marital_i + \beta_5 edu_yr_i + \beta_6 household_income_i + \beta_7 distance_i + \varepsilon_{i1} \quad (13)$$

The outcomes derived from this model exhibit non-significance across all variables. Despite the lack of statistical significance, we observe a higher relational value within the treatment group and a negative relation with distance, aligning with our expectations. To maintain brevity, we present the regression outcome in the Appedix (A4, Table 15).

Robustness Check

Based on the Ramsey RESET test results, there is no evidence of omitted variable bias in our model. While this test provides some support, its conclusiveness is debated in the literature (such as by Antonakis et al. (2010)). Therefore, we turn to incorporate consolidated RV variable (*relval*), derived from PCA.

As explained before, the inclusion of *relval* does not substantially change the results, either for the model for WTP or for donation. For ease of comparison, the first and third columns show the outcome from our simple models for WTP (Equation 4) and donation (Equation 9) respectively. The second and fourth columns show the model after controlling for *relval* in the WTP and donation models. In light of the lack of substantial findings and to maintain brevity, we relegate these regression results to the appendix of this study (refer to A5, Table 16).

Subsample as a Robustness check

To further verify the robustness of our results, we analyze a random subsample of 100 observations, with an even split between the treatment and control groups. This distribution addresses the initial intention to evenly divide the sample, which the KoboCollect app did not fully achieve. The regression outcomes for this subsample are consistent with our primary models (refer to Appendix A6, Table 17).

4.2 Discussion

As the title suggests, this paper explores how RVs influences individuals' willingness to contribute towards conservation efforts. The willingness to contribute is further broken down into willingness to pay (WTP) and a willingness to donate (or as referred throughout the study as donation scenario).

Even though the mean of the RV scores (agreements or disagreements to the statements) are higher for the treatment group, there is insufficient evidence for supporting our hypothesis that the treatment group has higher RV than the control.

The following two hypotheses entail the main theme of this paper, namely the hypothesis that the WTP of the treatment group is higher than the control group, and the donation intention is higher for the treatment group. When accounting for the sociodemographic characteristics as well as distance from the waterbodies, we observe that the treatment group has a higher WTP by 40.75 Taka, with 90% confidence. However, the model for donation does not achieve statistical significance.

We also conjecture that, individuals who migrated from places with close proximity to the waterbodies to have higher WTP. At cursory glance from the results, we see a positive relation of

distance and WTP, which is contrary to our expectation. A granular look reveals a more nuanced result, namely that unless household income is substantially higher, people with closer proximity to waterbodies are likely to have higher WTP. The hypothesis about donation amount to be higher for people from closer proximity however does not achieve statistical significance.

Our final conjecture is that the hypothetical bias is lower for the treatment group, if present at all. The correlation is negative for the treatment group and the hypothetical bias, aligning with our expectations. However, the lack of statistical significance prevents us from asserting the result.

5. Conclusion

Climate change profoundly impacts the lives of millions, with the poorest and most vulnerable being hit the hardest (Rigaud et al., 2018). This paper examines how internal migrants in Bangladesh respond to policies aimed at conserving and enhancing resilience of communities living in low elevation coastal zones (LECZs) in Bangladesh.

Seminal works on relational values by Chan et al. (2016) and Himes and Muraca (2018), highlight that Relational values (RVs) add a new descriptive nuance to the human-nature relationship, which is not adequately captured by instrumental and intrinsic value frameworks. Our study aims to use the concept of RV and assess its impact on conservation efforts, quantified by the contingent valuation (CV) Method. To the best of our knowledge, this is the first study to use the RV salience to evaluate its impact on the conservation behavior, particularly in the context of Bangladesh, a country emblematic of those impacted by climate change (Eckstein et al., 2021).

For this study we conduct a lab in the field experiment with a final sample size of 300 individuals. We collect data from different parts of Dhaka, the capital of Bangladesh, aiming at settlements where most internal migrants reside. To ensure clarity for the respondents, we present financial amounts, including those in the CV study, in the local currency, Taka, and provide the survey questionnaire in both English and Bengali. The survey participants are randomly split into control and treatment groups, with RV aspects salient to the treatment group.

Our analysis reveals that while the treatment group shows higher mean RV scores, the RV of the treatment group is not significantly higher than the control group, invalidating our first conjecture.

Next, we examine whether pro-environmental behavior, as quantified by the CV studies, are comparably higher for the treatment group. When controlling for sociodemographic characteristics and distance from waterbodies, we observe that the treatment group has a higher WTP by 40.75 Taka, supporting our hypothesis regarding WTP with 90% confidence. However, the model for donation intentions does not achieve statistical significance.

Interestingly, we find a counterintuitive positive relationship between distance from waterbodies and WTP. A more detailed analysis reveals that unless household income is substantially higher, individuals living closer to waterbodies are likely to have higher WTP. This finding partially aligns with our hypothesis about the impact of proximity on WTP. However, the hypothesis regarding higher donation amounts for those from closer proximity to waterbodies does not achieve statistical significance.

Our final hypothesis states that the treatment group would exhibit lower hypothetical bias compared to the control group. While the correlation between the treatment group and hypothetical bias is negative, as expected, the result is not statistically significant.

Our study also underscores the importance of accounting for the sociodemographic characteristics while devising conservation policies. The findings from this study should be evaluated with caution, as they mainly indicate correlations, which should not be confounded to causation. Future research could expand on these insights by increasing the geographic scope to different regions within and outside Bangladesh, and by increasing the sample size to better understand the generalizability of the findings and identify region-specific factors impacting relational values and conservation behavior.

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Appendix

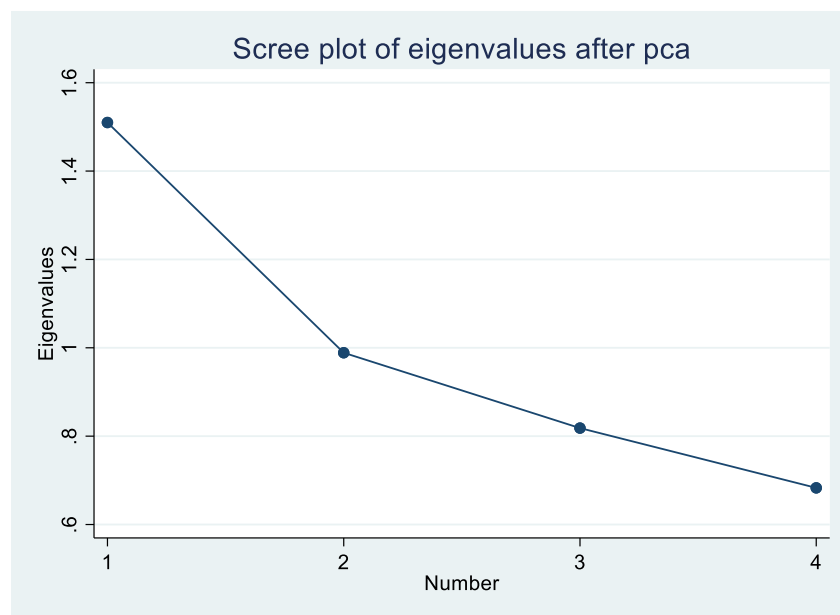
A1. Link to Annex

The following is the link to the Annex, that contains the survey questionnaire/codebook, along with data for replication.

<https://github.com/Tazkeer/Annex-to-Master-s-Thesis/blob/e93eb5e57dd2afa072d9290be2d36dec791203d5/README.md>

A2. Principle Component Analysis (PCA) of RVs

Figure 7. Scree plot to identify the component after PCA of RVs



(own figure)

Figure 7 shows a scree plot to determine the number of components that may be used after conducting PCA. Since the curve kinks at 2, we retain only one component, which we name as “relval”.

A3. Deeper look into WTP

To better understand why the distance from waterbodies has a positive being relationship with WTP decision of the respondents, we categorize the wtp into the categories as follows:

- wtp category 1 if $wtp = 0$
- wtp category 2 if $0 < wtp < 60$
- wtp category 3 if $60 \leq wtp < 150$
- wtp category 4 if $wtp \geq 150$

Based on these categories, we carry out an ordered logit (ologit) regression, as outlined in Equation 5 (a and b).

Table 11. Ordered logistic regression

wtp_cat	Coef.	St.Err.	z	p-value	[95% Conf	Interval]
treatment	-0.466	0.352	-1.32	0.186	-1.156	0.225
distance	-0.003	0.025	-0.14	0.892	-0.052	0.046
treatment#c.distance	0.046	0.034	1.36	0.174	-0.020	0.113
female	-0.329	0.264	-1.25	0.213	-0.845	0.188
age	-0.01	0.009	-1.07	0.285	-0.028	0.008
marital	-0.048	0.068	-0.71	0.478	-0.181	0.085
edu_yr	-0.036	0.032	-1.12	0.261	-0.099	0.027
household_income	0.000034	0.00	1.75	0.08*	0.00	0.00
cut1	-2.482	0.664			-3.784	-1.18
cut2	-0.74	0.647			-2.008	0.527
cut3	0.668	0.639			-0.584	1.919
Mean dependent var		2.630	SD dependent var			0.985
Pseudo r-squared		0.016	Number of obs.			300
Chi-square		12.062	Prob > chi2			0.148

This table present the results from equation 5. The dependent variable, wtp_cat is representing the four different categories of wtp. The explanations of all other variables are available in Table 3. The treatment and distance are interacted, forming the treatment#c.distance variable. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

We then look into the Marginal Effects Analysis as follows.

Table 12. Marginal effects of the Ologit regression

	dy/dx	Delta-method std. err.	z	p-value	[95%	conf .interval]
distance						
_predict#_at						
1 1	0.000	0.003	0.140	0.892	-0.005	0.006
1 2	-0.005	0.003	-1.860	0.062*	-0.010	0.000
2 1	0.000	0.003	0.140	0.891	-0.006	0.007
2 2	-0.005	0.003	-1.960	0.050**	-0.010	0.000
3 1	-0.000	0.002	-0.140	0.892	-0.003	0.003
3 2	0.003	0.002	1.770	0.076*	-0.000	0.006
4 1	-0.001	0.004	-0.140	0.892	-0.009	0.008
4 2	0.007	0.004	1.920	0.055*	-0.000	0.015

Average marginal effects
Model VCE: Robust

Number of obs. 300

dy/dx wrt: distance

- 1._predict: Pr(wtp_cat==1), predict (pr outcome(1))
- 2._predict: Pr(wtp_cat==2), predict(pr outcome(2))
- 3._predict: Pr(wtp_cat==3), predict(pr outcome(3))
- 4._predict: Pr(wtp_cat==4), predict(pr outcome(4))

- 1. _at: treatment = 0
- 2. _at: treatment = 1

The marginal effects analysis reveals that distance has varying marginal effects on different WTP categories across treatment groups. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively.

Table 13. Descriptive Statistics if wtp <60

Variable	Obs.	Mean	Std. Dev.	Min	Max
household income	139	9773.381	5873.122	500	21000

Table 14. Descriptive Statistics if wtp >60

Variable	Obs.	Mean	Std. Dev.	Min	Max
household income	127	11480.315	5855.875	500	21000

As explained in the results section, the mean household income of respondents with wtp higher than 60 Taka is higher than the ones with wtp lower than 60 Taka by approximately 1707 Taka on average. In other words, unless the household income is significantly higher, people who are closer to waterbodies are likely to have higher WTP. The amounts however are not economically significant, i.e., the difference in wtp are very miniscule amounts.

A4. Checking the impact on RV

Table 15. Impact of treatment, sociodemographic characteristics and distance on relval

VARIABLES	Dependent variable: relval		
	(1)	(2)	(3)
treatment	0.0330 (0.144)	0.0368 (0.147)	0.0371 (0.147)
female		-0.369** (0.171)	-0.365** (0.172)
age		-0.00420 (0.00561)	-0.00417 (0.00561)
marital		-0.0421 (0.0584)	-0.0417 (0.0587)
edu_yr		4.35e-05 (0.0169)	-0.000105 (0.0170)
household_income		-3.95e-06 (1.37e-05)	-3.83e-06 (1.38e-05)
distance			-0.00180 (0.0125)
Constant	-0.0184 (0.109)	0.529 (0.412)	0.538 (0.420)
Observations	300	300	300
R-squared	0.000	0.027	0.027
Adjusted R2	0.00362	0.00362	0.00362

This table shows the results from equations 11 to 13. The explanations of these variables are available in Table 3. All of the estimates from the regression are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

A5. Incorporating RV in the WTP and donation models

Table 16. Incorporating relational value in the wtp and donation models as part of robustness.

VARIABLES	Dependent variable: wtp		Dependent variable: donation	
	(1)	(2)	(3)	(4)
treatment	40.75* (24.13)	40.91* (24.25)	0.597 (3.443)	0.560 (3.447)
relval		-4.138 (11.68)		1.031 (1.354)
female	-26.16 (30.21)	-27.67 (29.98)	-13.31*** (4.184)	-12.93*** (4.212)
age	0.848 (1.076)	0.831 (1.073)	-0.0577 (0.130)	-0.0533 (0.130)
marital	-4.486 (8.532)	-4.659 (8.609)	1.350 (1.106)	1.393 (1.104)
edu_yr	1.062 (3.411)	1.062 (3.411)	1.468*** (0.486)	1.468*** (0.486)
household_income	0.00589** (0.00230)	0.00587** (0.00229)	0.000821*** (0.000315)	0.000825*** (0.000314)
distance	3.228* (1.837)	3.220* (1.840)	0.0770 (0.278)	0.0788 (0.276)
Constant	23.89 (79.54)	26.12 (78.64)	28.59*** (9.685)	28.03*** (9.665)
Observations	300	300	298	298
R-squared	0.055	0.056	0.152	0.153
Adjusted R2	0.130	0.130	0.130	0.130

This table shows the results from the Equation 4 (column 1) and equation 9 (column 3) and incorporating relational value (relval) to the models (column 2 and column 4 respectively). The explanations of these variables are available in Table 3. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

A6. Subsample as a part of Robustness check

Table 17. Regression outcomes of a random subsample of 100 observations.

VARIABLES	Dependent variable: wtp		Dependent variable: donation	
	(1)	(2)	(3)	(4)
treatment	40.75* (24.13)	78.45* (43.43)	0.597 (3.443)	0.384 (6.148)
female	-26.16 (30.21)	74.10 (51.62)	-13.31*** (4.184)	-11.46 (7.805)
age	0.848 (1.076)	2.759 (1.829)	-0.0577 (0.130)	0.176 (0.230)
marital	-4.486 (8.532)	6.608 (17.12)	1.350 (1.106)	-1.020 (1.566)
edu_yr	1.062 (3.411)	7.902 (6.302)	1.468*** (0.486)	0.933 (0.842)
household_income	0.00589** (0.00230)	0.0101*** (0.00382)	0.000821*** (0.000315)	0.000634 (0.000522)
distance	3.228* (1.837)	9.112** (3.886)	0.0770 (0.278)	-0.398 (0.509)
Constant	23.89 (79.54)	-264.2** (131.8)	28.59*** (9.685)	32.33* (16.57)
Observations	300	100	298	98
R-squared	0.055	0.169	0.152	0.115
Adjusted R2	0.0459	0.0459	0.0459	0.0459

This table shows the results from the Equation 4 (column 1) and equation 9 (column 3) and the regression for the same model but with a smaller sub sample in column 2 and column 4 respectively. The explanations of these variables are available in Table 3. All of the estimates from the regressions are robust to heteroscedasticity. The asterisks *, **, and *** denote significance at 10%, 5% and 1% levels, respectively. Robust standard errors are presented in parentheses.

Declaration of Authorship

(German version)

Ich versichere durch eigenhändige Unterschrift, dass ich die Arbeit selbstständig und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Alle Stellen, die wörtlich oder sinn-gemäß aus Veröffentlichungen (auch aus dem Internet) entnommen sind, habe ich als solche kenntlich gemacht. Ich weiß, dass bei Abgabe einer falschen Versicherung die Arbeit als mit 'nicht ausreichend' (1 Bewertungspunkt gemäß § 16 Abs. 2 Allgemeine Bestimmungen, Note 5, ECTS-Grade F) bewertet gilt.

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By signing this declaration, I confirm that I have completed the present thesis independently, without help from others and without using resources other than indicated and named. All phrases that are taken directly or indirectly from other sources (incl. electronic resources), quoted verbatim or paraphrased are indicated accordingly. I am aware that any violation of this declaration will result in the work being graded as 'failed' (0 grade points according to § 28 (2) 'Allgemeine Bestimmungen', ECTS-Grade F).

Tazkeer Azeez Chaudhuri

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