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Can Culture Guide Policy? Religious Messaging and Adaptation to Water Scarcity in Jordan

Giulia Buccione

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Casado del Alisal 5, 28014 Madrid, Spain
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Abstract

This paper tests whether culture can drive policy. I study a religious messaging intervention promoting water conservation in Jordan, where rising scarcity makes behavioral change urgent. I randomly assigned women attending religious classes to receive messaging on the sanctity of water in Islam or on an unrelated religious topic. The design held constant leader identity and nonreligious information. After three months, treated women reduced objectively measured water consumption by 18%. Exploring mechanisms, the messages work by instilling religious beliefs about water, especially those firmly rooted in the religious canon. In contrast, I observe a backlash against new practices, such as treated water adoption. Treatment effects are strongest when religious leaders emphasize moral responsibility over ritual practice. My findings provide new evidence on both the power and limits of harnessing culture to strengthen policy effectiveness.

JEL Codes: D91, Q25, Z12, Z18.

Keywords: Culture, religion, water scarcity, Middle East.

Giulia Buccione
CEMFI
buccione@cemfi.es

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1 Introduction

Public policy does not operate in a vacuum: it unfolds within cultural contexts that shape how individuals interpret and respond to interventions. Economists are increasingly recognizing that policies clashing with deeply rooted cultural norms can backfire (Bau et al., 2025; Nunn, 2019). While this emerging literature has focused on accommodating local culture in policy design (Bau et al., 2024; Alsan et al., 2019), a different question arises: can cultural norms and traditions be actively harnessed to enhance, rather than hinder, policy effectiveness?

This paper studies whether religion, a core aspect of culture, can promote urgent conservation behaviors in the face of rising water scarcity. I focus on the Middle East, the region facing the most severe water scarcity in the world, further exacerbated by climate change (FAO, 2025). In response to this mounting crisis, individuals must adapt their behaviors and prioritize water conservation, yet shifting ingrained daily habits is challenging. At the same time, Islam, the dominant religion in the region, grants water a sacred status and strongly emphasizes frugality in water use. This presents a unique opportunity to test whether culture can serve as a catalyst for change.

I test a cultural intervention which I define as *religious messaging*: the delivery of behaviorally-relevant messages grounded in religious teachings, and transmitted within the institutions of religious daily life. In the context of Jordan, practicing women routinely attend classes at the mosque with female preachers, known as waethats, who instruct them about Islam.[1] I therefore embed a field experiment within these ongoing classes, where water conservation messages, framed through Islamic teachings, are delivered by recognized religious leaders to their established congregations. Moreover, by involving religious leaders who have privileged access to women, this study provides an opportunity to learn about an often-overlooked population in a gender-segregated society. Indeed, women are key to the design of effective water policies, as they are primarily responsible for household water management, which makes up for 45% of total water consumption in Jordan (Proctor, 2014; MWI, 2020).

I conduct my experiment with nineteen waethats who already had two ongoing regular classes each, allowing me to randomize one to treatment and one to serve as control.[2]

[1] It is estimated that approximately 24–42% of Muslim women participate in such classes, based on authors' calculations using data from the Jordanian Ministry of Awqaf and Islamic Affairs.

[2] The intervention was designed in partnership with GIZ and the Jordanian Ministry of Awqaf and Islamic Affairs, which trained waethats to teach Islamic lessons on water. After the training, leaders were left free to structure the class as they saw fit, mirroring how waethats routinely receive thematic training from the Awqaf and then convey it independently in their classes.

Women in treated classes receive messaging about the importance of water and its conservation from an Islamic perspective. Control women attend a lesson on an unrelated religious topic. All women, regardless of treatment status, also receive nonreligious information from the waethats about Jordan's water crisis, the importance of water conservation, and available water-saving methods. The intervention consists of a single class session, after which leaders revert to independently choosing class content. This design accounts for important potential confounders. Stratification by waethat accounts for leader identity, selection of believers into waethat, and her implicit endorsement of conservation; the nonreligious information equalizes baseline knowledge across arms; and the active control holds the religious setting constant. Consequently, effects are identified by experimental variation in the content of the religious message delivered in the class.

Immediately after the class, I find that exposure to religious messaging fosters prosocial behavior related to water conservation, proxied by women's donations to charities involved in water preservation.[3] Treated women donate 1.7 Jordanian Dinars (JOD) more to water charities ($p < 0.001$) and are 12 p.p. more likely to choose a water charity over alternative charities to receive a donation on behalf of the class ($p < 0.001$). The treatment also affects perceptions of own water use: treated women revise downward their assessment of how efficiently they manage water at home by 0.39 points on a 7-point scale ($p < 0.001$).

These changes in prosocial attitudes translate into a substantial reduction in water consumption three months after the intervention: water bills collected at that point show that treated women's households consume 4.8 cubic meters less water ($p < 0.05$), an 18% reduction relative to the control group. This effect is large compared to existing nonprice conservation interventions, which typically reduce water use by 2 to 5% (Ferraro and Price, 2013; Bernedo et al., 2014; Brent et al., 2015). Using estimates of residential water demand elasticities in Jordan, achieving a comparable reduction would require a 35 to 70% increase in water tariffs (Al-Najjar et al., 2011; Klassert et al., 2018). Quantile Treatment Effect (QTE) estimates reveal that this substantial cutback is driven by high-usage households, consistent with previous findings in the conservation literature (Allcott, 2011; Ferraro and Price, 2013). Treated women accomplish this by reducing the frequency of and time spent on water-intensive household chores, such as laundry and house cleaning, and by adopting water-saving methods, such as water reuse or the installation of home devices. Notably, some of these methods are one-time investments, with durable effects on water use. These behavioral changes improve household water security: treated women

[3]Since water scarcity is a collective issue, donations provide a measure of women's willingness to sacrifice private resources for the common good.

are 27% less likely to report that their water tank ran dry during the previous month ($p < 0.10$).

I then turn to explore the mechanisms behind the effects on behaviors, leveraging data on religious beliefs. I argue that religious messaging operates by shifting women's religious beliefs about water rather than through alternative channels. When asked about their primary motivation for conserving water in the three months following the intervention, treated women are 21 p.p. more likely ($p < 0.001$) to cite religious concerns (*"save water to be religiously pious"*), rather than environmental (*"save water to be more water efficient"*) or moral ones (*"save water for future generations"*). In contrast, treatment and control women display similar knowledge of the water crisis and of water-saving practices, stated willingness to adopt such practices, and general religiosity. This allows me to rule out information, social desirability, salience, and broader religious priming as the main drivers of the results.

Crucially, the treatment does not uniformly influence all religious beliefs related to water. I measure support for six water-related beliefs that vary in the extent to which they are grounded in Islamic sources, ranging from canonical principles, such as the duty to avoid waste, to recent reinterpretations, such as the religious permissibility of treated water. A clear gradient emerges. Religious messaging strengthens beliefs that are firmly rooted in the religious canon, has little effect on beliefs that are in tension with other religious prescriptions, and generates backlash on beliefs based on novel reinterpretations. This backlash is concentrated among the most religiously conservative women, suggesting that they interpret religious messages through the lens of their existing convictions.

Finally, the classroom setting may further influence behaviors by affecting perceived social norms. I find that treated women are more likely to believe that others in their community would also view excessive water use in chores as wasteful, rather than a signal of wealth or cleanliness, and are more likely to discuss water management within their social networks. These findings suggest that religious messaging may operate not only through private belief updating, but also by shaping social norms around water use, consistent with prior research indicating the influence of social norms on conservation behaviors (Ferraro and Price, 2013; Allcott, 2011).

Cultural interventions are not only about the content of the message, but also about how it is delivered and by whom. I thus turn to examine whether the effectiveness of religious messaging varies across religious leaders. Importantly, religious leaders, after receiving the same training, were free to choose both the content and teaching style of their classes, which naturally introduces variation in implementation. Using Empirical

Bayes methods, I document substantial heterogeneity in treatment effects across leaders, indicating that some leaders are more effective than others. To better understand the source of this heterogeneity, I perform human-based content analysis of class recordings to classify the topics covered and teaching style adopted. I find that leaders emphasizing concepts of moral responsibility, such as stewardship of nature or sinfulness of wasting water, are associated with larger treatment effects than those discussing more tangible aspects of religious practice, such as the correct methods to perform ablutions.[4] Classes are also more effective when leaders adopt an engaging, participatory teaching style rather than a top-down approach.

This paper relates to four strands of literature. Primarily, it contributes to a recent literature on the role of local culture in shaping development policy (Nunn, 2019; Bau et al., 2025). While there is extensive observational evidence on the interaction between development programs and culture (Ashraf et al., 2020; Lowes and Montero, 2021; Martinez-Bravo and Stegmann, 2022; Ramos-Toro, 2023; Moscona and Seck, 2024), a new experimental literature has begun to bring culture into policy design itself, studying how interventions can be tailored to the cultural environments they enter. Much of this experimental work thinks of culture as a constraint to be accommodated (Bau et al., 2024; Alsan et al., 2019).[5] A related strand explores ways to alter the conditions sustaining harmful norms (Bursztyn et al., 2020; Gulesci et al., 2025).[6] In contrast, this paper shows that cultural norms can become a lever for change, in my case aimed at resource conservation. I find that such cultural interventions are most effective when their narratives resonate with tradition (Michalopoulos and Rauh, 2024), but can backfire when they challenge deeply held beliefs.[7] Testing if culture can serve as an instrument for policy, rather than a constraint, is to the best of my knowledge new to the literature.

This work is also related to a literature on religion and economic behavior (Iannaccone, 1998; Barro and McCleary, 2006; Bénabou et al., 2015; Benjamin et al., 2016). A strand of this literature uses natural experiments or randomized exposure to religion to estimate

[4]Furthermore, concepts highlighting women's role as homemakers, thus primarily responsible for water, show opposite effects, displaying a tension between water-conservation efforts and traditional gender roles.

[5]For instance, building on Lowes and Montero (2021), who show that colonial medical campaigns eroded trust in medicine, recent research in health policy designs interventions that explicitly address these deep-seated trust deficits to improve health outcomes (Bau et al., 2024; Alsan et al., 2019).

[6]Bursztyn et al. (2020) find that correcting misperceptions about support for women's employment in Saudi Arabia increases women's job search and actual female labor force participation. Gulesci et al. (2025) show that introducing in a given culture an intermediate action can facilitate the elimination of a harmful norm by replacing it.

[7]This final result aligns with McGuirk and Nunn (2024), showing that agricultural development projects misaligned with local practices increase the risk of conflict.

causal effects on behavior (Clingingsmith et al., 2009; Bottan and Perez-Truglia, 2015; Cantoni, 2015; Campante and Yanagizawa-Drott, 2015; Bryan et al., 2020). These studies vary the intensity of religious exposure; I instead hold the religious environment fixed and vary the doctrinal content delivered within it, by randomly shifting the topics covered in religious classes that are part of believers' daily life. This lets me explore how teachings relate to beliefs and behavior, keeping overall exposure constant. I find that the content of religious messaging can induce strong behavioral responses, but that these effects hinge on the relationship between the messages and the religious actors involved. Believers respond more strongly to messages grounded in established canon, while the most effective leaders are those emphasizing moral responsibility over details of daily ritual practice.

This paper also relates to a literature using moral appeals to change behavior.[8] This strand studies the effects of short messages or prompts on socially desirable behaviors, including tax compliance (Hallsworth et al., 2017), resource conservation (Ito et al., 2018), debt repayment (Bursztyn et al., 2019), and TV license fees payment (Fellner et al., 2013). In contrast, I design a full-fledged religious intervention where religious leaders share bundles of doctrinally grounded messages over longer classes to their congregants. I obtain effects in the upper range of this literature. Also, by virtue of granular data on beliefs, I can shed some light on the cognitive process of subjects responding to these messages. The closest paper is Bursztyn et al. (2019), who show that messaging clients of an Indonesian Islamic bank with religious moral appeals increases credit card repayment. They identify moral concerns, rather than religion, as the main mechanism. I instead find that religious beliefs drive my effects. This shows that moral appeals can also operate wholly through religious feelings, especially when engaging more deeply with the existing religious environment.

Finally, my results also contribute to research on natural resource conservation.[9] Existing research points to reductions in water usage of around 2%–5% from interventions leveraging social pressure (Ferraro and Price, 2013; Bernedo et al., 2014; Brent et al., 2015), 8–22% from real-time information on electricity price and quantity (Jessoe et al., 2021), up to 31% from automated enforcement of water restrictions (West et al., 2021). My estimates fall within this range, with my intervention framed through religion showing greater impact than conventional social-norm programs. Consistently with previous studies, high users are the most responsive to social norms and belief-based interventions

[8]This literature is grounded in theoretical work on motivated beliefs, identity and nonmonetary incentives (Akerlof and Kranton, 2000; Bénabou and Tirole, 2003, 2006; Gneezy, 2005).

[9]For energy, see: Allcott (2011); Ayres et al. (2012); Allcott and Rogers (2014); Pellerano et al. (2017); Schultz et al. (2007).

(Allcott, 2011; Ferraro and Price, 2013).

The rest of the paper is organized as follows. Section 2 describes the Jordanian context and the study population. Section 3 illustrates the experiment and the intervention in detail. Section 4 describes the data and empirical specification. The main results are shown in Section 5, and mechanisms are discussed in Section 6. Section 7 presents results of content analysis. Section 8 presents cost-benefit-analysis estimates. Section 9 concludes.

2 Context

The Middle East and North Africa (MENA) is the most water-stressed area on the planet, and climate change is projected to intensify this scarcity. The World Bank projects that per capita water availability will fall by 50% by 2050.[10] Extreme water insecurity might have far-reaching negative socioeconomic and political consequences in an unstable geopolitical scenario, generating economic losses, social unrest, conflicts, and new waves of displacement.[11] Since water and its preservation have special standing in Islam, this paper studies if a water policy grounded in the tenets of Islam can foster individuals' adaptation to water scarcity. I conduct my experiment in Jordan, located in the Levantine area of the MENA, which is projected to be severely affected by droughts and reduced precipitation (Rajsekhar and Gorelick, 2017).

2.1 Water Scarcity in Jordan

Jordan is the second most water scarce country in the world (UNICEF, 2023). The population's water demand is met by over-pumping the groundwater, which is used twice as quickly as it can be replenished (USAID, 2023). Worryingly, climate change and population growth are accelerating the pace at which water supply is depleting.[12] Jordan's

[10] See World Bank, 2007.

[11] The climate-related water shortage in MENA might cause economic losses estimated at 6% to 14% of GDP by 2050, which is the world's largest (World Bank, 2017). Moreover, protests and tensions over water shortages have already arisen in Iran, Jordan, and Egypt (Reuters, 2019). Tensions over water availability might also heighten the likelihood of "water wars" in the near future (Mbaku, 2020). Finally, climate-induced compound events could generate new waves of refugees and displaced people, with up to 2-6% of North Africa's population expected to move internally by 2050 (Clement et al., 2021).

[12] Rajsekhar and Gorelick (2017) points to three major changes in climatic patterns in Jordan: an increased risk of droughts, from 23% in the period 1981–2010 to an estimated 94% in the period 2071–2100; a 4.5. degree Celsius rise in temperatures in 2071-2100; a 30% decrease in annual rainfall by the 22nd century. Moreover, following the onset of the Syrian conflict, the arrival of around 655,000 refugees, around 8% of Jordan current population, has further increased water pressure on this limited resource

per person annual water share stood at 61 cubic meters per year in 2022 (FAO, 2026). In comparison, an average American disposes of approximately 9,000 cubic meters of water per year (Proctor, 2014).[13]

Water scarcity is primarily a domestic, daily issue. In Jordan, domestic uses account for 45% of total water consumption (MWI, 2020). Water scarcity is binding: households get access to running water once or twice per week in general. The days when water arrives are known as "water days", when water is expected to flow from pipes for twenty-four hours. During water days, households replenish rooftop tanks to store water for the rest of the week and do the most water-intensive chores, such as laundry and floor cleaning, since running water is available then. Once the supply is cut off, households rely on their rooftop tank water until the next water day. Piped water is generally not used to drink; households use it for cleaning, laundry, and hygiene, while purchasing bottled water for drinking. Responsibility for most chores falls disproportionately on women, who also have to make sure the tank lasts through the week. Moreover, rising water scarcity is challenging already-strained resources and lifelong habits of water management. Water cut-offs, delays, and intermittent service are increasingly common, especially in the dry summer months, and more and more people run out of water long before the next water day (Proctor, 2014).

Although Jordanians are broadly aware of water scarcity, awareness has not translated into meaningful behavioral change. While USAID (2018) surveys report that 62% of respondents believed Jordan to face a critical water shortage, environmental protection ranks last among priorities for government spending and foreign aid (Abufalgha, 2022).[14] Most respondents attribute water scarcity to population pressures (23%) rather than to household misuse or individual behavior (3.4%), which may reduce felt personal responsibility to act (USAID, 2018).[15] Consistent with this, water conservation practices are limited to a handful of low-effort routines, rather than part of a coherent adaptive response to the escalating water crisis. For instance, closing faucets and testing for leaks are the

(Proctor, 2014).

[13]These figures refer to renewable freshwater availability, not actual household consumption. In the 1990s, the annual renewable freshwater available per person in Jordan stood at 540 cubic meters, a decrease of 73% over 30 years (Faruqui et al., 2001). When supply falls below 1,000 cubic meters per capita per year, a country is said to experience water scarcity, and below 500 cubic meters, absolute scarcity.

[14]Awareness of water scarcity is high, thanks to multiple efforts of the government and international NGOs to communicate knowledge on the impending crisis and foster collective action. For instance, in 2019, a large governmental awareness campaign was able to reach 3.5 million Jordanians through slogans on billboards, newspapers, television and social media (Dergham and Favazza, 2020).

[15]Population-related reasons comprise the presence of Syrian refugees (12.1%) and rapid population growth (10.9%).

most common behaviors, yet even these are adopted by fewer than 14% of respondents;[16] uptake of technology-based solutions remains limited, with adoption rates varying across devices (USAID, 2018).[17] Table A1 (Panel A) summarizes these patterns. Also, while the region's water-service fees are extremely low and governments could in theory raise them to limit water demand, water reforms are extremely unpalatable for political and cultural reasons.[18]

2.2 Water in Islam

About 98% of Jordanians practice Islam and manifest their practice in everyday life.[19] Water has special standing in Islam, and its conservation is prescribed by religion (Snarey, 1996).[20] My experimental classes delved into six main concepts on water in Islam[21]:

Blessing, stressing the invaluable gift water represents to humankind. Water is considered the foremost of God's blessings, as it is the very substance from which God made all living things (*"We made from water every living thing"*; Quran, Surah Al-Anbiya, 21:30).[22] Its status as a blessing is not taken for granted but framed as a gift demanding

[16] According to USAID (2018), the most popular conservation efforts take the form of small behavioral changes, such as closing water faucets during short washing (14%), adoption of indoor and outdoor cheap water-saving devices (9.5%), or taking shorter showers (9.5%). Adoption rates are lower for practicing some form of rainwater harvesting (2.1%), or installation of smart flush toilets (2.7%).

[17] Efficient dishwashers are used by only 6.5% of households, efficient shower-heads by 28% of households, dual flush-toilets by 27% of households, faucets with water saving devices by 40% of households; outdoor water-efficient irrigation methods by fewer than 1% (USAID, 2018).

[18] On average, the price charged for water in the region is about 35% of the cost of production, making the implicit water subsidy the highest in the world (Kochhar et al., 2015). Islamic law principles treating water as a public good make market approaches to water management, such as increasing tariffs and privatizing utilities, frown-upon by the society at large (Faruqui et al., 2001). MENA citizens believe that it is governments' responsibility to keep utility prices low, which makes governments reluctant to raise tariffs for fear of widespread protests (de Waal et al., 2023).

[19] Table A1, using Arab Barometer data from 2022, shows that 88% of respondents reported to pray daily, and 73% to read and/or listen Quran daily. Half of respondents stated that religion should guide decisions on important social issues.

[20] Islam originated in desertic societies faced with the need to promote the prosocial use of water, a highly scarce resource. Islamic tenets, encompassing preservation and equitable sharing of water, reflect the central role of water scarcity (Snarey, 1996).

[21] These six concepts represent the main dimensions through which Islam addresses water, as codified in the training guide developed by Islamic scholars from the Ministry of Islamic Affairs and GIZ. Together they cover the full doctrinal landscape on water in Islam, from theological principles to practical ritual guidance.

[22] Water symbolizes Allah's benevolence to humankind, which made life possible: "And Allah has sent down water from the sky, thereby giving life to the earth after its death" (Quran, Surah Al-Baqarah, 2:164). Water is a blessing even in the afterlife. The Quran depicts God's throne resting upon water (Quran, Surah Hud, 11:7) and describes Paradise as a "Gardens beneath which rivers flow" (Quran,

gratitude: *"Have you observed the water that you drink? Is it ye who shed it from the rain cloud, or are we the shedder? If we willed we verily could make it bitter. Why, then, give you not thanks?"* (Quran, Surah Al-Waqi'ah. 56:68-70).

Stewardship, emphasizing humans' responsibility as caretakers of nature. Humans are considered vice-regents or stewards (*khulafah*) of the earth, who inherit it from older generations and are responsible to pass it on to posterity (*"The world is beautiful and verdant, and God has made you its stewards"*; Sahih Muslim).[23] The concept of *khilafah* (stewardship) is one of the central principles of Islamic environmental ethics (Benadi, 2024).

Sin, considering misuse of water as sin. Islamic sources explicitly condemn water waste (*"Eat and drink: but waste not by excess, for God love not the wasters"*, Quran, Surah Al-A'raf, 7:31) and frame it as a matter of divine judgement. For instance, the Prophet warned that among the unforgiven people on the Day of Judgement are *"a man who possessed superfluous water on a way [and] withheld it from the travellers"* (Sahih al-Bukhari). The prohibition extends beyond waste to pollution of water sources.[24]

Practice, covering water-related religious practices, especially, the daily ritual ablutions of *whudu* and *ghusl*. It is mandatory for an observant Muslim to reach a state of ritual purity through ablutions before prayers. Without valid ablution, prayer is invalidated (*"Allah does not accept the prayer of anyone who loses ritual purity until he performs ablution"*, Sahih al-Bukhari, 135; *"cleanliness is half of faith"*, Sahih Muslim). *Wudu* is a short ablution preceding the five mandatory daily prayers (*salat*), which are among the five pillars of Islam.[25] *Ghusl* is a longer ablution consisting in a full-body cleansening mandatory in some cases before the performance of various rituals, such as the Friday prayer. Crucially, the centrality of water conservation calls for moderation even in such holy ritual task; excess is not merely discouraged but condemned: "*Do not waste water*

Surah Al-Baqarah, 2:25).

[23]Humans are appointed as stewards (*khulafah*) of God's creation: "He is the One Who has placed you as successors on earth and elevated some of you in rank over others.." (Quran, Surah Al-An'am, 6:165).

[24]Specific prohibitions include urinating in stagnant or running water, breathing into drinking vessels, and failing to cover water containers, all interpreted by Islamic scholars as precautionary measures to preserve water purity. Interestingly, Geruso and Spears (2018) show that such sanitation practices can account for the large child mortality advantage Muslims hold over Hindus in India.

[25]Mandatory (*Fard*) wudu consists in washing several parts of the body (namely, face, arms, wiping the head and the feet). *Sunnah* wudu, recommended but not obligatory, asks washing each organ three times, following the Prophet's practice. Finally, it is forbidden washing more than three times, which is condemned as waste: "This is the ablution, and whoever does more than this [three times], has done evil, transgressed the limits and wronged himself (Sunan Abu Dawud).

even if performing ablution on the bank of a running river" (Sahih al-Bukhari). The Prophet even established a concrete unit of measure not to be surpassed when performing ablutions.[26] When water is altogether unavailable, Islamic jurisprudence permits *tayammum*, a dry ablution using clean earth or sand, designed to accommodate scarcity.[27]. Islamic law further regulates *which* waters may be used for ritual purification.[28] Charity is another aspect of practice intertwined with water.[29] In Islamic doctrine, giving alms to the poor is an important act of worship, and the Prophet emphasized sharing water as the foremost act of charity (*"The best charity is giving water to drink"*; Sahih al-Bukhari). In early Islamic desert societies, this mostly amounted to affluent believers' provision of public wells and fountains to their communities.[30]

Ownership, addressing legals aspects of water rights from Islamic jurisprudence (*Sharia)*, primarily the ownership and sharing of water on religious grounds.[31] It recognizes water as a communal resource that should be equally accessible to all members of the community, and forbids private ownership of it (*"Muslims have common share in three things: pasture, water and fire"*; Musnad).[32] Today, Islamic jurisprudence draws a precise distinction between water itself, which is free and communally owned, and the service of delivering it. Water bills should not be seen as a price for water, but a fee for the infras-

[26]The quantity of water to be used in ablutions is suggested in the ablution habits of the Prophet, who "used to perform ablution with one mudd of water [two-thirds of a liter] and used to take a bath with one sa' up to five mudds [2–3 liters]" (Sahih al-Bukhari). These quantities represent the Prophet's personal practice and are widely cited in Islamic jurisprudence as the recommended upper bound for ablution water use.

[27] *Tayammum* is prescribed in Quran 5:6: If you are ill, or on a journey, or one of you comes from the place of relieving himself, or you have touched women and find no water, then seek clean earth and wipe over your faces and hands with it."

[28]Only *tahir* (pure) water, that is naturally occurring water such as rain, river, sea, or well water, is valid for ablution. Used or impure water (*musta'mal*) is not permissible. Water mixed with impurities loses its purifying capacity depending on whether its color, smell, or taste is altered. Islamic jurisprudence classifies water into several categories: *mutlaq* (pure, valid for purification), *musta'mal* (used water, not valid), *najis* (impure, not valid), and water mixed with pure substances (*tahir*), the validity of which depends on the degree of alteration.

[29]Zakat is a religious obligation to donate an amount depending on one's wealth, and it is one of the five pillars of Islam. Sadaqah, in contrast, is voluntary charity.

[30]For instance, the Prophet advised one of his companions to buy the well of Ruma (a settlement in Arabia) and make its water freely available to the whole community. Today, sadaqah takes the form of donations to provide access to clean water to poorer communities (Faruqui et al., 2001)

[31]Sharia refers to the Islamic legal framework derived from the Quran and the Prophet Muhammad's tradition. It encompasses laws and ethical guidelines governing various aspects of Muslim life.

[32]The Prophet discouraged trading water, and even forbade to sell excess water ("What is forbidden is to sell the surplus water of a well and springs at their source"). Although interpretations have evolved, economic measures like raising tariffs and privatizing utilities remain controversial in Muslim-majority nations because of these principles.

tructure that transfers it to the household, and refusing to pay them is therefore forbidden as theft.[33] More fundamentally, the communal nature of water implies that even when water is legally accessed and bills duly paid, excessive consumption may deplete a shared resource that belongs equally to all (Faruqui et al., 2001).

Women Role, highlighting women's pivotal role in water management. While Islamic doctrine does not assign water management exclusively to women, in practice across Muslim-majority societies they are the primary homemakers and caregivers, which includes responsibilities related to managing water and instilling conservation habits in the next generation (Proctor, 2014).

2.3 Women Attending Religious Classes

Women are key in the design of effective water policies. Indeed, they are in charge of day-to-day management of water in the household, as they conduct water-intensive household chores and are responsible of making sure water is available (Proctor, 2014). However, social norms limit women's mobility in Jordan, a gender-segregated society, making it challenging to reach them (World Bank, 2013).

In this setting, practicing women often attend classes at the mosque with female preachers, known as waethats. This institution developed following the Islamic revival of the 1970s, when women began organizing weekly religious lessons at the mosque to read and deepen their knowledge of the Quran.[34] The Jordanian government formalized the role of female religious leaders from the 1980s onward, with increasing state intervention in the religious sphere, establishing the Ministry of Awqaf and Islamic Affairs to coordinate the training and activities of religious leaders.[35] Waethats emerged as the official category of female religious leaders operating under this institutional framework, providing religious instruction to women across the country. Today, Jordan has around 7,600 mosques, and between 24% and 42% of Jordanian women participate in waethat classes.[36] Waethats receive periodic training from the Ministry on specific religious topics, which they then

[33] By the same logic, water theft, such as disabling meters, tapping pipes illegally, or infringing on water networks, is explicitly condemned as a sins: "Some men misappropriate Allah's property, and they will go to Hell on the Day of Resurrection"; Sahih al-Bukhari.

[34] Mahmood (2005) provides an ethnographic description of these women's movements in Cairo, Egypt, and the broader Islamic revival from women's perspective.

[35] As in other countries in the region, increasing state supervision of religious institutions was driven by concerns over the rise of global jihadism and radicalization (Wiktorowicz, 2001; Robbins and Rubin, 2013).

[36] Authors' calculations using administrative data from the Ministry of Awqaf and Islamic Affairs.

convey independently in their classes.

Participation in these classes is voluntary and women usually attend classes for several years with the same waethat, with whom they form long-term connections.[37] Religious leaders thus have privileged access to women, compared to other actors, such as secular organizations or state actors (Underwood and Kamhawi, 2015). My intervention leverages this socially accepted setting to target women and thus domestic water use, which accounts for 45% of Jordan's total water consumption (MWI, 2020)

3 Experimental Design

To study the effect of religious messaging on water conservation, I conducted a randomized control trial (RCT) with women attending religious classes with female religious leaders. In the treatment group, women attended a class on water preservation from an Islamic perspective, while those in the control group attended a class on a religious topic unrelated to water. Both groups additionally received nonreligious information on water conservation. With the assistance of my local partners, The German Agency for International Cooperation (GIZ) and the Ministry of Awqaf and Islamic Affairs, I randomized 712 women into the experiment.

3.1 Sample Selection: Women Attending Religious Classes

Setting. The study was conducted in urban communities in the northern governorates of Amman, Irbid, and Mafraq, the most populated areas of Jordan, where water reservoirs exhibit the highest rates of depletion necessitating timely conservation efforts (MWI, 2020). Figure 1, Panel (a), shows the location of the three governorates. My partner GIZ had been running a water conservation program with religious leaders across Jordan since 2015, training imams, Catholic priests, university students, and waethats as water ambassadors in partnership with the Ministry of Awqaf and Islamic Affairs.[38] In 2022, the project was restarting after being slowed down by COVID-19 mosque closures in 2020–2021. I selected study neighborhoods from areas not yet reached by the GIZ program, using an internal GIZ survey conducted in 2022 that interviewed people around neighborhood mosques and asked whether they had previously heard about water conservation in

[37] Moreover, differently from men, women have a regular, usually weekly, interaction with their waethat, since waethats organize recurrent classes with the same group of women over a prolonged period of time. Therefore, the extent of interaction and built trust provides a better setting to deliver successful messages.

[38] For more details on the project, see: https://www.giz.de/en/projects/improvement-comunal-water-efficiency-through-cooperation-religious-authorities.

the mosque.[39] I retained only neighborhoods where fewer than 10% of surveyed women answered affirmatively, reducing concerns that the religious messaging intervention would be contaminated by prior exposure.

Religious Leaders. Within the selected communities, I considered as eligible only waethats who had been conducting two regular weekly classes with distinct, non-overlapping groups of women, a prerequisite for within-waethat randomization as detailed in subsection 3.2. The Ministry of Islamic Affairs identified female religious leaders active in those communities who met this criteria and agreed to collaborate, yielding a final sample of 19 waethats.[40] All 19 waethats received training on water and Islam from GIZ and the Ministry of Islamic Affairs and delivered both a treatment and a control class. Panel (b) of Figure 1 shows the exact location of treatment and control mosques where the selected waethats operate.

Women. The final sample consists of 712 women who were already attending religious classes with the selected waethats.[41] To prevent self-selection into treatment, the topic of the class was not announced in advance, and all women present on the day of the intervention were included upon giving their consent.[42] Attendance on the day of the class was 88.4% among control women and 89.1% among treated women, with no significant difference across groups.

Table A2 in the Appendix reports women's baseline characteristics. The sample is relatively homogeneous in terms of socioeconomic background. Most of the women have some form of higher education, but 94% are housewives, reflecting women's limited participation in MENA economies despite their skills. Relevantly, 53% of women in my sample attend mosque more than once a week, giving them frequent opportunities to leave their homes. Religious leaders' influence is high: 80% of women seek their advice several times per year, and 19% at least once a month; 84% reports sometimes changing their mind on an issue after consulting with them, and 23% do so frequently.

Women in my sample receive water in their houses less than twice per week on water days. Approximately 50% of respondents indicate that the weekly water supply barely meets their needs, and around 50% have faced issues of water access in the past month.[43]

[39] The questions used was: "Have you ever heard or seen anything about water-saving from an imam or waethat?"

[40] The AEA Registry reports 20 waethats. One waethat was dropped between registration and implementation for logistical reasons.

[41] The AEA Registry plan estimated a sample of 800–1,200 women. The lower realized sample reflects having 19 rather than 20 waethats and class sizes at the lower end of the possible range of 20–30 women per class.

[42] 99% of women provided consent.

[43] While water service is generally predictable, increased water scarcity has created issues of intermit-

On average, each woman in the sample owns approximately two water tanks, used to store water between water days.

Our recruitment approach does not guarantee a representative sample, but our participant demographics largely align with regional population characteristics on key dimensions. Table A4 compares our study sample to Muslim women in Amman, Irbid, and Mafraq governorates from the Arab Barometer Wave 7 (2022), a nationally representative survey conducted in the same year as the intervention. Panel A shows that study women are comparable to the reference population in terms of marital status, household size, and education. Study women are slightly older (45.8 vs. 43.0 years), have fewer children (2.4 vs. 3.2), and are less likely to be employed (6% vs. 10%), which is consistent with the profile of waethats' attendees being mainly housewives with time to attend mosque classes. Although the difference in means on some of these characteristics is significant, the magnitude of the differences is small across age, number of children, and employment. Since our study sample consists of women who regularly attend religious classes, a more appropriate comparison group is women with similarly intense religious practice. Panel B therefore restricts the Arab Barometer sample to women who report always praying the dawn prayer Fajr on time, which requires the greatest commitment among the five day prayers and I thus use as indicator of consistent religious practice.[44] Under this restriction, study women are comparable across all characteristics except trust in others, where study women report higher trust (18% vs. 5.5%).[45]

3.2 Randomization and Timeline

The intervention took place between July 24 and August 14, 2022 in the urban areas of Amman, Irbid and Mafraq. Figure 2 illustrates the timeline of the study and data collection activities.

I designed a pairwise randomized experiment, in which the treatment assignment was randomly determined at the class level stratifying by religious leader, so that each of them taught one treatment and one control class.[46] The randomization was private to the

tency and unpredictability in the hottest summer months, especially in the period of July–August when my intervention took place.

[44]Religiosity is high in Jordan overall: 83% of Arab Barometer female respondents in our three governorates report praying daily. Fajr provides a more demanding benchmark, with 56.67% reporting to *Always* pray it on time.

[45]This difference likely reflects the nature of waethat classes as long-standing collective religious groups, consistent with the documented association between participation in group religious activities and social trust (Caicedo et al., 2023; Putnam, 2000; Ruffle and Sosis, 2007).

[46]Indeed, to stratify at the waethat level, I only considered waethats who regularly hold one class per

research team and performed after the classes were scheduled to ensure that the waethats could not selectively shift classes. To prevent self-selection into the treatment, women were not informed in advance about the topic of the class. Table 1, columns (1)–(3), verifies the randomization balance in the baseline sample of 712 women.[47] There are no significant differences between treatment arms in any of the observed variables.

Stratification by religious leader takes into account self-selection of women into religious leaders, given that the classes were already formed and running before the intervention, as well as any effect related to the identity of the leader delivering the message.[48]

Before delivering the experimental class, and irrespective of being in treatment or control group, the waethat held an information session in which she read and explained to women an informational leaflet on the water crisis in Jordan, the importance of water conservation, and available water-saving techniques to mitigate water wastage in the household, without any religious framing. This session lasted approximately 20 minutes.[49]

Providing information to both groups aimed to equalize baseline knowledge of secular aspects of water scarcity and conservation. Ideally, the intervention is meant to provide religious messaging on water, holding constant exposure to nonreligious information on the topic. However, religious messages may also transmit nonreligious information that influences behavior.[50] For instance, a message about the religious suitability of treated water not only reassures believers about its permissibility but also informs them of the technology's existence. By delivering information, in this example both groups would receive information about the technology, but only treated women would be further instructed on it being religiously acceptable. Finally, by highlighting both the research team's interest in water scarcity and the leader's endorsement of the issue, the leaflet

week for each of two groups of women.

[47]The first column of the table displays means and standard deviations of baseline characteristics in the control group, and column (2) displays means and standard deviations of baseline characteristics in the treatment group. Column (3) shows mean differences between treatment and control and pvalues associated with the test for differences in means, within strata. Table C1 repeats the exercise without strata fixed-effects, showing that women were comparable across treatment and control even without taking religious leader strata into account.

[48]Literature on leadership has shown that charismatic leaders can affect various outcomes, such as fertility (Bassi and Rasul, 2017), social movements (Dippel and Heblich, 2021), votes (Cagé et al., 2023) and nation building (Assouad, 2020).

[49]See Appendix E for more details on the information session. The leaflet was distributed to women only at the end of the class: since women took a short quiz on facts presented in the leaflet, this prevented them from copying the answers.

[50]A large literature in environmental economics documents behavioral responses to information provision. For instance, Jessoe and Rapson (2014) show that providing families with real-time feedback on prevailing prices and quantity of energy consumed reduced their energy consumption.

mitigates the scope for differential social desirability bias across groups.[51]

Following the information session, classes were delivered according to treatment status. In treatment classes, women attended a class on water conservation from an Islamic perspective, where religious leaders instructed participants on the importance of water and its preservation in Islam. Control women instead attended a class on a religious topic unrelated to water. Relying on an active control ensures that any difference in outcomes between treated and control women reflects the content of the religious message on water, rather than a context effect, such as being in a mosque, or attending a class with peers.[52]

After the intervention, religious leaders returned to their regular class schedule.[53] They were instructed not to teach topics related to water in Islam for the following three months, and were informed that enumerators might conduct unannounced visits to verify compliance. Five random visits were conducted and no instances of waethats teaching water-related topics were observed.

3.3 Treatment Details

The treatment content was drawn from an existing GIZ program on water conservation that had been running in Jordan since 2015. Within this broader initiative, I designed a tailored intervention suitable for evaluation. Specifically, the treatment was based on a preexisting training manual, *"The Guide on Water from an Islamic Perspective"*, jointly developed by religious scholars from the Ministry of Islamic Affairs, the Ministry of Water and Irrigation, and GIZ.[54] With their guidance, I identified in the manual the six concepts most directly relevant to water conservation from an Islamic perspective: *Blessing*, *Sin*, *Stewardship*, *Ownership*, *Practice*, and *Women Role*.[55] I described these concepts in Section 2.2. The selected waethats then underwent a one-day training on these six concepts from the manual.[56] Once trained, waethats had the freedom to structure the

[51]Indeed, the leaflet also includes non-religious motivational language promoting water conservation (e.g., "your community needs you"), without any explicit religious content. See Appendix E for further details.

[52]For instance, Allcott (2011) finds a 2% decrease in energy consumption from providing peers' usage nudges, suggesting that social context alone can shift behavior.

[53]That is, the intervention consists of a single class session, after which leaders revert to independently choosing the content of their classes.

[54]The manual, available in English and Arabic upon request from its authors, was produced to train religious leaders on the Islamic foundations of water preservation.

[55]The manual also contained non-religious content on water scarcity in Jordan and practical water-saving tips developed by GIZ, which formed the basis of the informational session and the related training.

[56]The training sessions consisted of frontal lessons covering the contents of the manual, as well as practical lessons on how to preach on water using role plays, active engagement and examples.

treatment class as they saw fit, choosing which topics to emphasize among those covered in the training. Moreover, leaders had the autonomy to choose their teaching styles, including whether to incorporate prayers, examples, anecdotes, and other elements. The class sessions lasted 90 minutes, comprising around 20 minutes of information session and 70 minutes of religious instruction.

Given that all religious leaders' session were audio-recorded, I can use such recordings to describe the content covered in the classes and characterize the intervention. First, I transcribed 38 audio recordings from all classes, tokenized the conversations of each class by sentence, and cleaned the sentences.[57] Using a narrative approach, I relied on three human coders to classify all tokenized sentences. To facilitate this process, I developed a codebook to train the coders in identifying and classifying sentences into categories of interest. The primary goal was to classify each sentence based on its religious content within the six major concepts covered in the training (see Appendix D for details on the procedure as well as for examples of classes' content and classified sentences).

Figure 3 provides an illustration of a data point, a class. Panel (a) presents the raw content discussed in the 19 treatment classes as computed using the coded text data, grouped by the six major concepts associated with water and Islam.[58] The vertical axis represents the share of sentences belonging to each concept in a class. Most waethats devoted substantial content to *Blessing*, *Stewardship*, and, to a lesser extent, *Sin* in framing water conservation, suggesting these concepts may constitute a natural theological entry point for discussing water in Islam. *Practice*, the more behaviorally concrete concept, appears frequently but with greater variation. *Ownership* and *Women Role* are discussed in fewer classes.[59] Figure 3, Panel (b), shows the distribution of the major class topics, identified by the concept presenting the largest share of sentences in a class.

Beyond content, religious leaders had full autonomy over how to structure and deliver their classes. Coders assessed several dimensions of teaching style at the class level. The majority of waethats (68%) adopted a top-down lecturing style with limited engagement, while the remainder preferred a more interactive, discussion-based approach. In terms of tone, 73% were encouraging and inspirational, while the rest adopted a more admonitory

[57]Data preparation involved removing interjections (e.g. "yeah", "ouch", "great", "yes", "ok", etc.), dropping filler sentences (e.g. "you know", "uhm", etc.), and removing greetings and religious exclamations (e.g. "good evening", "peace be upon you", "if God wills", etc.).

[58]I exclude the residual category of topics not related to water to ease visual representation. However, it is a marginal category in treatment classes, as shown in Figure A1. Indeed, the average share of sentences related to water in Islam across treatment classes is 90.45%.

[59]Waethats may have felt less comfortable discussing *Ownership*, given that it engages with more complex Islamic jurisprudence on water rights that could require a more formal religious education.

register. Theological explanation was the predominant teaching method, followed by practical examples and anecdotes, with only a small number of waethats relying primarily on prayer. Religious sources used covered evenly the Quran, Sunnah, and Sharia in roughly equal measure.[60] Finally, the most commonly invoked role models were religious figures, mainly the Prophet (36%) and other pious Muslims (36%), with secular figures such as ancestors or pious community members cited less frequently.

3.4 Active Control Group Class

Control consists of a class on a religious topic unrelated to water. Thus, topics such as fasting, which may relate to drinking water, were considered off limits. As shown in Table A3 in the Appendix, most waethats preached about the migration of the Prophet Mohammad from Mecca to Medina since part of the intervention coincided with the anniversary of this event, celebrated as the Islamic New Year. Figure A1 confirms that water-related sentences in control classes account for approximately 20% of total content, consistent with the share of class time devoted to the information session. No religious framing of water was detected in the audio recordings of control sessions.

4 Data and Empirical Specification

4.1 Data

This study draws on three sources of data: baseline, midline, and endline surveys conducted with women; endline household water bills; and classroom observation data from audio recordings of all experimental sessions.

Women's survey. On the day of the intervention, before the class began, enumerators collected baseline information on women's socioeconomic characteristics, water access, and religiosity. Midline data were collected immediately after the class ended, measuring short-term effects on prosociality toward water through incentivized donation measures to water charities. Enumerators also measured women's beliefs about water-related religious norms.[61] Endline data were collected by phone three months after the intervention,

[60] The *Sunnah* refers to the teachings, practices, and sayings of the Prophet; it is the second source of Islamic authority after the Quran. *Sharia* is Islamic law, derived from the Quran and the Sunnah, which governs religious practice as well as aspects of daily conduct.

[61] Belief measures were designed in collaboration with local partners to be context-specific and to accurately detect changes in Islamic beliefs about water, allowing a direct test of belief-driven mechanisms.

measuring women's beliefs about water-related religious norms and domestic water usage, including the time spent on and the frequency of several water-intensive household chores. At baseline, women were asked to provide their telephone numbers if they consented to the research team calling them to follow up with the endline survey. Of the 712 women in the baseline sample, 390 provided valid contact information. In order to generate an endline sample balanced between treatment and control, we randomized within treatment status to generate the list of 300 endline women to call.[62] Table 1, columns (4)–(6), reports balance in baseline characteristics of women in the endline sample by treatment status, along with the differences between them. None of the differences are statistically significant.[63]

Endline Water Bills: At the end of this three-month period, enumerators conducted phone calls with participants, asking them to share their water bills' pictures for the fall billing quarter.[64] This period aligns with the quarterly billing cycle for water.[65] Out of 300 households contacted, 7 could not locate their bill and 3 submitted a bill corresponding to the wrong billing cycle. Neither participants nor religious leaders were informed of the intention to collect water bills until one week before endline. At that time, enumerators conducted brief sessions explaining how to interpret the information on water bills and to ensure women presented the correct documents.[66]

Class Observation Data: To measure religious leaders' behavior in the class, all the experimental classes were audio-recorded. Enumerators transcribed the recordings, and trained human coders analyzed the content, documenting the topics discussed and the teaching style adopted by each religious leader, as described in Appendix D.

[62]The target of 300 women was set jointly to ensure balance and to remain within budget. The random draw was not stratified by religious leader, as phone number provision was too sparse within some waethat-treatment cells. Appendix B documents a comprehensive attrition analysis, including checks for differential phone provision across waethats (Table B10).

[63]Table C1 repeats the exercise without strata fixed-effects, showing that women were comparable across treatment and control even without taking religious leader strata into account.

[64]Figure A2 shows an example of a collected water bill.

[65]Jordan's quarterly billing cycle was in place until September 2023 when the system shifted to monthly billing. Endline data collection occurred in late December 2022–January 2023, the period in which participants received their post-intervention water bill for October–December 2022.

[66]In Jordan, many households are unfamiliar with how to interpret their water bills (USAID, 2018).

4.2 Outcome Measures

Prosociality. I measure prosociality regarding water by two incentivized donation measures collected at midline. I focus on donations to water charities; to the extent that water conservation implies taking a sacrifice for the benefit of the community, donations should measure this extent of being prosocial. Moreover, these measures, by requiring the respondent to incur a cost when answering, should reduce concerns about demander effects in such short-term answers reported at the end of the class. The first measure, *Individual Donation*, records how much money a woman, upon receiving 15 JOD from the research team, chose to donate to a charity working on water resource preservation.[67] Specifically, enumerators told women that they would receive an in-kind good worth 15 JOD and asked how much of this amount they wished to donate; the corresponding monetary value was transferred to the charity, and women received the remaining in-kind value. The good itself, water filters, was selected by GIZ, and its identity was not revealed until after the donation choice was made.[68]

My second measure of prosociality, *Collective Donation*, is a dummy indicating whether a woman chose a water charity over two alternative charities to receive a 700 JOD donation on behalf of the class.[69] The research team committed to donating to whichever charity received the majority of votes recorded privately in the survey. Women chose among a water charity, an environmental charity working on energy conservation, and a charity offering schooling opportunities. This measure therefore captures preferences for water-related prosocial action conditional on acting prosocially.[70] It also addresses concerns about demand effects: while *Individual Donation* was elicited through direct interaction with the enumerator, *Collective Donation* was recorded privately by the participant, with enumerators instructed not to look at the response.

Water Consumption. *Water Consumption* is real quarterly water consumption in

[67] The charity operates in the water sector, with activities including spring cleaning, groundwater monitoring, dissemination of water-saving methodologies to households and farmers (such as rainwater harvesting and greywater reuse), and provision of safe water access to poor households.

[68] Withholding the identity of the in-kind good served two purposes. First, it avoided the difficulty of asking participants to map continuous donation preferences onto a discrete physical bundle. Second, since the good itself was water-related, revealing it in advance could have biased donation choices in complex ways, for instance with women preferring to keep rather than donate a water-preserving tool after attending the experimental classes.

[69] Strictly speaking, *Collective Donation* captures preferences over prosocial targets rather than prosociality itself, since the donation is made by the research team and a woman's vote does not entail a personal cost.

[70] It thus isolates preferences for water conservation from general generosity captured by *Individual Donation*.

cubic meters as recorded on the quarterly water bill. *Water Expenditure* is real water expenditure, in JOD, as charged on the quarterly water bill.

4.3 Estimation

To estimate the effect of the treatment, I use the following specification:

$$y_{iwc} = \alpha_w + \beta T_c + \epsilon_{iwc} \tag{1}$$

Where, y_{iwc} is the outcome of interest for woman i who attended class c taught by waethat w. T_c is an indicator equal to 1 if the woman attended the treatment class on water conservation from a religious perspective, and 0 for control women. α_w indicates the strata fixed effects for waethats and ϵ_{iwc} is the error term.[71] Standard errors are clustered at the pair level—that is, the religious-leader level—, following De Chaisemartin and Ramirez-Cuellar (2024). I present p-values obtained by bootstrapping, resampling pairs over 2,000 replications, since the pair-clustered variance estimator becomes downward-biased with fewer than 20 pairs.[72]

β identifies the causal effect of receiving religious messaging on water under the standard assumption that, within each stratum, treated and control women do not differ on average. Baseline balance (Table 1, discussed in Section 3) supports this assumption. Stratification by waethat allows me to take into account potential confounding factors from women's self-selection into religious leaders, and the identity of the leader delivering the message. Moreover, both treated and control women attended a religious session and received identical nonreligious information on water conservation from the religious leader. Therefore, effects are identified from experimental variation in the content of religious messaging, holding constant leader identity, nonreligious information, and religious context.

[71] To assess whether including pre-treatment covariates would improve precision, I apply the post-double-selection LASSO procedure of Belloni et al. (2014) to a high-dimensional set of baseline characteristics. The procedure selects no additional controls beyond the fixed effects, indicating that observed covariates have limited predictive power for either the outcome or treatment assignment once fixed effects are accounted for. Accordingly, the final specification includes only the treatment indicator and fixed effects. However, I show that the results on main outcomes are robust to including all available baseline controls (Table C5 and C6).

[72] Appendix C reports results under alternative levels of clustering and randomization inference.

5 Main Results

5.1 Effects on Prosociality

In this section, I document how religious messaging about water conservation affects prosocial behaviors toward water and household water consumption. I begin with results on prosociality, proxied by the two incentivized donation measures described in Section 4, measured at midline immediately after the class. Table 2 summarizes the estimation results. For each outcome in the table, the first column shows the treatment effect without religious leader fixed effects, and the second column shows treatment effects in my preferred specification, which includes waethat fixed effects (i.e., the randomization strata).[73] In all specifications, the treatment effects are sizable and statistically significant: in my preferred specification, treated women donate 1.7 JOD more to a charity working on water ($p < 0.01$, column (2)), and are 12 p.p. more likely to choose to donate collective alms-giving to a charity working on water conservation ($p < 0.01$, column (4)). Relative to control mean, the treatment increased individual donations by 22%, and increased the likelihood that women chose water charities for the class donation by 32%. Figure 4 shows the results visually.

Read together, the two measures provide complementary evidence. The effect on *Individual Donation* suggests that treated women became more prosocial, but it does not allow me to disentangle whether the shift is specific to water, given that the receiving charity was fixed. *Collective Donation*, by asking women to choose between a water charity and alternatives (including also a non-water environmental cause, the energy conservation charity), helps isolate a specific preference for water conservation, rather than a general pro-environment or prosocial attitude. Moreover, *Collective Donation* mitigates concerns about demand effects. While *Individual Donation* was elicited through direct interaction with the enumerator, *Collective Donation* was recorded privately by participants, with enumerators instructed not to look at the response.

[73] Because women self-select into religious leaders, leader-level characteristics could in principle confound the treatment effect. The within-waethat design addresses this directly: each waethat taught both a treatment and a control class, with assignment randomized within leader. I therefore include religious-leader fixed effects in my preferred specifications, identifying treatment effects from within-leader comparisons. As shown in Table 2, adding leader fixed effects leaves the treatment coefficients virtually unchanged but increases the overall R-squared (not shown in table); for instance, for the case of *Individual Donation*, the overall R-squared increases from 0.02 to 0.27, indicating that leader-level heterogeneity explains a substantial share of variation in outcome levels. At the same time, the within-leader R-squared is 0.04, similar in magnitude to the no-FE R-squared, confirming that the treatment effect is identified from within-leader variation rather than cross-leader differences.

5.2 Effects on Water Usage

Next, I investigate treatment effects on water consumption and expenditure, drawn from household water bills three months after the intervention in my endline sample. I complement these objective measures with several self-reported measures from the endline survey. To measure whether reduction in water use translates into welfare gains, *Days Without Water* records the number of days in the past month that the household's tank ran dry. Additional self-reported measures on the frequency and time spent on water-intensive domestic chores provide further insight into the behavioral margins through which conservation occurs.

Table 3 shows that the treatment substantially decreases the amount of water used in the household (see Figure 5 for graphical visualization). In my preferred specification, treated women's households consumed 4.8 cubic meters less water over the three-month billing period ($p < 0.05$, column (2)), corresponding to a reduction of 18% relative to the control mean.[74] This translates into 3.2 JOD less in water expenditure ($p < 0.001$, column (4)), a 25% reduction in the bill, or approximately 0.1% of average annual per-capita income in 2022, reflecting the high subsidization of Jordanian water tariffs.[75]

The 18% reduction in water consumption is large relative to comparable behavioral interventions. Information-based and social-norm interventions in the water sector typically generate effects of 2% to 5% (Ferraro and Price, 2013; Bernedo et al., 2014; Brent et al., 2015; Allcott, 2011), while regulation-based interventions reach 31% (West et al., 2021). In an literature in which a 1 to 3 percent behavioral response is considered meaningful, the incremental contribution of religious messaging is remarkable. The religious messaging intervention generates an effect more than three times larger than nonprice nudges, while remaining below the magnitudes achievable through coercive policy.

To put the magnitude in everyday terms, the estimated reduction corresponds to roughly 0.05 cubic meters of water saved per household per day, equivalent to about one 5-minute shower per household per day.[76] An alternative way to benchmark the

[74] Appendix Figure A3 shows that water-consumption distributions are balanced across arms at baseline (Kolmogorov–Smirnov p = 0.73) and stable among control households between baseline and endline (Wilcoxon p = 0.35), indicating that the endline gap reflects the intervention rather than preexisting differences or common trends.

[75] Jordan's GDP per capita in 2022 was approximately USD 4,332, equivalent to JOD 3,072 at the prevailing exchange rate of 1.41 USD/JOD: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=JO. The estimated quarterly water bill saving of 3.2 JOD therefore represents about 0.1% of average annual per-capita income. The small monetary saving makes financial incentives an unlikely driver of the observed behavioral change.

[76] The household-level daily reduction is computed as $4.8\text{m}^3/90\text{days} \approx 0.053$ m^3 per day. To benchmark this against showering, I assume a standard showerhead flow rate of 0.01 m^3 per minute and a typical

magnitude is to ask what tariff increase would induce the same 18% reduction. Using the residential demand elasticity of $0.25 - 0.52$ estimated for Greater Amman (Al-Najjar et al., 2011; Klassert et al., 2018), an 18% reduction would require approximately a $35 - 70\%$ increase in water tariffs.[77]

The aggregate effect masks substantial heterogeneity across the consumption distribution. Figure 6, Panel (a) presents the cumulative distribution function of water consumption by treatment status, suggesting that the effect is concentrated among high-users in the upper tail. This pattern is in line with prior evidence on environmental behavioral interventions, finding larger treatment effects for high-usage households, who likely can reduce consumption at lower cost (Ferraro and Price, 2013; Allcott, 2011).[78] To investigate this more rigorously, I examine quantile treatment effects (QTEs) of the treatment on water consumption.[79] Figure 6, Panel (b), reports the set of QTEs and confirms that the substantial cutback in water consumption is driven by high-usage households above the 75th percentile (or see Table A9).[80] This indicates that religious messaging is most effective precisely where conservation potential is largest, suggesting the intervention could be efficiently targeted at high-volume users in settings where universal coverage is costly.

The reduction in water consumption translated into a measurable improvement in household water access. Treated women report 0.36 fewer days in the past month during which their household tank ran dry ($p < 0.10$, Table 3, column (6)) - equivalent to gaining back 8 hours of water access. This corresponds to an 11 percentage-point reduction in the likelihood of experiencing any day of water shortage, relative to a control mean of 27%. The results suggest that lower consumption allowed households to manage their stored water more effectively across the weekly water-day cycle.

How did treated women reduce consumption? Table 4 presents treatment impacts on the frequency and duration of four water-intensive household activities: showering,

5-minute shower, which uses approximately 0.05 m^3. The daily saving therefore corresponds to roughly one foregone (or shortened) 5-minute shower per household per day. With an average household size of 5 members in my baseline sample, this implies approximately 0.01 m^3 per person per day saved.

[77] This calculation follows directly from the elasticity definition $\varepsilon = \frac{\%\Delta Q}{\%\Delta P}$. For a target reduction of $\%\Delta Q = -0.18$ and elasticity estimates in the range $\varepsilon \in [-0.52, -0.25]$, the implied price increase is $\%\Delta P = \frac{-0.18}{\varepsilon} \in [0.35, 0.72]$.

[78] For instance, Allcott (2011) finds that, after a social-norm information campaign targeted at reducing energy consumption, households in the highest decile of pre-treatment consumption decrease usage by 6.3%, compared to 0.3% for the lowest decile.

[79] Quantile treatment effects are estimated absorbing religious-leader fixed effects.

[80] Table A5 interacts the treatment indicator with baseline water consumption, showing that each additional unit of pre-intervention water use amplifies the treatment effect by a precise and statistically significant margin. Since this measure is self-reported, I do not include it in the main analysis. The interaction coefficient on water consumption is negative and statistically significant, indicating that for each additional cubic meter of baseline consumption, the treatment effect grows by 0.23 cubic meters.

religious ablutions (*wudu*), house cleaning, and laundry. For each activity, I measure *frequency* as the number of times the woman performed the chore in the past week, and *duration* as the time (in minutes) spent the last time she performed it.[81] The findings suggest a pattern of behavioral change on most of the household chores. For showering, treated women reduced frequency by 0.27 times per week ($p < 0.10$, column (1)), with no detectable change in shower duration. For house cleaning, the adjustment occurred on the intensive margin: time spent per cleaning fell by 5.3 minutes ($p < 0.05$, column (6)), while frequency was statistically unchanged. Regarding laundry, duration per cycle increased by 7.6 minutes ($p < 0.001$, column (8)), consistent with adoption of water-efficient programs that require longer cycles.[82] In contrast, I find no effect on either the frequency or duration of religious ablutions, a finding I return to in Section 6, which sheds light on which dimensions of behavior religious messaging can and cannot move. Treated women were also 21% more likely to report adopting at least one water-saving method ($p < 0.05$, column (9)), defined broadly to include water-saving devices (e.g., efficient appliances), behavioral techniques (e.g., reusing water across chores, using buckets), and infrastructure adjustments (e.g., fixing leaks). Since some methods involve durable, one-time investments, this suggest that part of the measured reduction in water consumption may persist beyond the three-month horizon. Figure A6 disaggregates these methods, showing that the increase is driven primarily by adoption of water-saving devices, and water reuse across chores.

To corroborate that the observed water savings reflect deliberate behavioral change, I examine how treated women updated their self-assessed water efficiency over time. At baseline, midline, and endline, women rated on a 1–7 scale how water-efficient they considered themselves to be in the house. Comparing baseline priors to midline posteriors elicited immediately after the class, Table A6, column (1) shows that treated women revised their self-assessment downward by 0.39 points relative to control ($p < 0.001$), suggesting the religious treatment made them more aware of room for improvement in their water-saving behavior right at the end of the class. Three months later, after they had measurably reduced consumption (Tables 3 and 4), treated women revised their endline self-assessment upward relative to the midline posterior (Table A6, column (3)), reverting to their baseline self-evaluation (Table A6, column (4)). Figure A4 illustrates this pattern,

[81] These two measures capture distinct margins of behavioral adjustment: frequency reflects how often a water-intensive activity is undertaken, while duration captures how intensively water is used per occurrence.

[82] Modern eco-cycle washing programs typically run 2–3 hours, compared to 1–2 hours for standard cycles, but use significantly less water per load.

showing that women's self-perception adjusted in line with their realized water use.

5.3 Robustness and Heterogeneity

I conduct a series of checks to validate the main findings. I first address concerns about attrition and item non-response, then about inference, and finally explore treatment effect heterogeneity.

Attrition. Sample attrition at baseline is null, as explained in Sections 3 and 4. However, the endline sample was randomly selected from the 390 women who provided their phone numbers at baseline. I assess attrition through several complementary checks. First, Table B1, column (1), shows that treatment status does not predict phone number provision and the differences are small (coefficient = 0.02; $p = 0.565$). Second, columns (2)-(7), report Lee bounds for the treatment effects on the main endline outcomes. Lower and upper bounds are obtained by trimming observations from the upper and lower tails, respectively, of the outcome distribution in the group with the higher observation rate, following Lee (2009); the bounds preserve the sign and statistical significance of the treatment effects. Third, Table B2 compares baseline characteristics of women who provided phone numbers to those who did not: only three show marginally significant differences. These differences are economically small (5-7 percentage points) and reflect a credible pattern where women more engaged with the religious community are also more willing to share contact information. Importantly, these differences do not threaten internal validity: treatment and control women within the endline sample are balanced on all baseline characteristics (Table 1, columns 4-6).

A separate concern in the endline sample is that phone number provision was differential between treatment and control women within a small number of waethats. To verify that this does not drive the endline results, Table B10 replicates the main endline specifications dropping waethats where the gap in phone provision between treated and control women exceeded 20 percentage points in either direction. The point estimates are stable in magnitude and significance.

Item non-response. Rates of item non-response vary across outcomes, raising the possibility that observed treatment effects could reflect selective response rather than genuine behavioral change. I address this concern through three complementary exercises. First, Table B3 shows that response rates do not differ systematically by treatment status across any outcome.[83] Second, Table B4 confirms that baseline characteristics are not

[83] I present results on robustness check hereon for *Water Consumption* only, given that *Water Expenditure* is just a transformation of this variable.

systematically different across treatment and controls in each estimation sample. Third, in Table B5, I report Lee (2009) bounds for each outcome and shows that the sign and significance of the main estimates are preserved under the most restrictive bounding assumptions on the missing data. Finally, although baseline controls are not included in my preferred specification, I verify as a precautionary check that response rates on these characteristics do not differ by treatment status (Table B9).

Inference. In Appendix C, Table C2, I present main results under alternative inference procedures: clustering at the class level (the unit of randomization), pair-level clustering without bootstrapping, and randomization inference with class-level standard errors. The results are largely unaffected. To address the concern of multiple hypothesis testing across primary outcomes, I implement the Westfall-Young step-down procedure of Westfall and Young (1993). All primary coefficients remain statistically significant at the 5% level after correction (Table C4). Lastly, Table C5 additionally shows that the estimates are robust to controlling for the full set of baseline characteristics.

External event. The intervention partially coincided with the Islamic New Year, which celebrates the migration of the Prophet from Mecca to Medina and may have heightened both religiosity and willingness to donate to charities. Table A8 replicates the main specification with an interaction between the treatment indicator and a dummy for whether the class took place during the Islamic New Year, and shows that treatment effects do not differ across periods, ruling out the calendar event as driver of the findings.

Heterogeneity by water scarcity. Finally, I study whether the treatment exhibits heterogeneous effects according to a measure of water scarcity, namely the distance between the day of the class and the last day a woman received water (that is, the water day). This distance measure can be interpreted as a proxy of water stress in the household; the longer it has been since the last water day, the more likely it is for households to experience water constraints because the water stored in their tanks decreases over time. Figure A5 shows heterogeneous effects by distance from the last water day, where I interact treatment with a set of dummies for the number of days elapsed between the day in which a woman attended the class and her last water day. I observe attenuation in the treatment effects: the more days have passed, the less effective the treatment becomes. The heterogeneity may be due to limited room for adjusting water-related behaviors among women who are already water constrained, or it could indicate that water-stressed women undergo a negative emotional response to the treatment when exhorted to save water. This suggests that delivery of policy interventions based on messaging has to take into account the timing and salience of the issue as well as unintended emotional responses.

6 Mechanisms: Religious Beliefs

Having demonstrated that religion can provide a powerful tool to promote pro-environmental behaviors, I move to investigate the mechanisms through which religious messaging operates. My hypothesis is that the treatment shifts behavior by influencing deep-seated religious beliefs about water. A growing literature on culture and development policy has studied local norms and beliefs as constraints to be taken into account when designing policy (Bau et al., 2024; Lowes and Montero, 2021). I build on the insight from Nunn (2019) to show that culture can also serve as a lever, focusing on religious beliefs. Theoretical work on motivated beliefs supports this view, suggesting that interventions targeting such beliefs can shift behavior (Bénabou and Tirole, 2016).[84] Yet existing empirical work on religious beliefs typically isolates a single channel; for instance, Bursztyn et al. (2019) use light-touch religious moral framing to shift credit card repayment in Indonesia. Such designs cleverly shut down several channels that correlate with moral appeals, including religious priming, and reminder effects. However, they do not explain how a full religious intervention operates, where doctrinal content, ritual practice, community setting, and trusted leadership interact. I take a complementary approach: rather than isolating one channel, I study a comprehensive intervention as delivered in the field, and characterize the belief changes it produces. This allows me to identify which religious beliefs the treatment moves, which it does not, and where it triggers backlash.

6.1 Religious Beliefs vs. Other Channels

I begin by establishing that the treatment operates specifically through religious beliefs about water, rather than through alternative channels such as other beliefs, increased nonreligious information, or general religiosity. First, I show that the treatment operates through religious beliefs rather than through beliefs other than religious ones. Two credible alternative beliefs affected by the treatment are sensitivity toward the environment or broader moral concerns. To test for this, at endline I asked women to identify their primary reason for saving water over the past three months among three options: religious ("save water to be religiously pious"), environmental ("save water to be more water efficient"), or moral ("save water for future generations"). Figure 7 shows that

[84] Moral values and political ideologies fulfill important functional needs of individuals and influence their actions. Among them, religion is a "number one form of valued beliefs," typically providing comfort and self-discipline (Bénabou and Tirole, 2016). Beliefs in an afterlife, for instance, directly influence anticipatory utility of engaging in prosocial actions, and just-world beliefs offer motivation for taking action.

treated women are 21 percentage points more likely than control women to cite religious concerns over environmental or moral ones ($p < 0.001$). The shift comes primarily from environmental reasons.[85]

A concern is that the treatment effect reflects greater exposure to nonreligious information on water, that is, treated women may simply have learned more about water conservation. The experimental design holds nonreligious information constant: religious leaders delivered the same secular session on water in both treatment and control classes. Still, the religious class may have increased the retention or salience of such non religious content. Table A7 shows that the treatment does not increase women's knowledge of water-saving practices (column (1)) or devices (column (2)), nor does it improve their performance on a quiz on water-conservation content covered in the class (column (5)).[86] A related concern is social desirability bias. Columns (3) and (4) mitigate this concern by examining stated willingness to adopt water-saving practices and devices at the end of the class. There is no detectable difference between treatment and control. Indeed, the nonreligious information session framed the importance of water conservation identically in treatment and control.[87]

Lastly, the treatment may have made women more religious or conservative in general, driving the behavioral effects. The active control design should take this concern into account, as both groups attended a religious class.[88] Nevertheless, Table A7 provides direct evidence against this interpretation. Treated women are no more likely to perform an optional night-time prayer (*tahajjud*, column (6)),[89] nor do they exhibit greater distrust of people from other religious faiths (column (7)). The treatment thus moves religious beliefs about water without affecting general religious practice or out-group attitudes.

Together, this evidence indicates that the treatment operates by shifting women's religious interpretation of water. I now turn to which specific religious beliefs about water the treatment affects.

[85] See Table A10, column (7), where the effect is expressed in standard deviations.

[86] *Known practices* and *Known devices* are the total number of practices and devices women report knowing at midline. The quiz consists of four questions on facts presented in the leaflet. Leaflets were distributed at the end of the class to prevent women from mechanically reading off the answers.

[87] *Would adopt practices* and *Would adopt devices* are measured by presenting women at midline with a list of practices and devices, and recording whether they would be willing to adopt each one.

[88] Moreover, these women were already regularly attending religious classes; it is unlikely that a single session shifting content toward water would make them more religious overall.

[89] *Tahajjud* is a voluntary night-time prayer performed after the obligatory *Isha* prayer and before the dawn *Fajr* prayer. Because it is not mandatory, performing it is regarded as a marker of strong personal religious devotion.

6.2 Religious Intervention at Work

My results provide evidence that the observed behavioral changes stem from changes in religious beliefs about water rather than alternative explanations. Cultural interventions –in this case religious ones– seem effective because they can affect deep beliefs and motivate individuals to change. This section moves a step forward and sheds light on which of such beliefs are most influenced by the treatment and thus most pivotal in designing successful religious interventions. I distinguish between individual and social beliefs. I first focus on *individual beliefs*, women's views on what Islam dictates in situations involving water, which the treatment can affect by directly discussing water use within Islamic doctrine. Second, I look at *social beliefs*, views on what women's reference group dictates in situations involving water; my religious treatment can affect social beliefs, as it occurs in a classroom setting where women attend with their peers.[90]

Individual Beliefs. I first turn to pinpoint which specific religious beliefs about water the treatment affected. Some religious beliefs may be more or less affected by the religious information provided in the treatment, and prior beliefs could interact with the process of belief formation. To map this, I designed the survey to elicit beliefs that vary in how strongly Islamic doctrine supports them. Drawing on pre-experiment fieldwork with religious leaders and Ministry scholars, who reported that some water-related beliefs in the training manual generally face more resistance, I selected six religious beliefs that vary from principles directly grounded in canonical sources to recent reinterpretations that conflict with long-held prescriptions.

First, I measure support for religious beliefs explicitly prescribed in canonical Islamic sources. I asked women whether they believed each of the following: Muslims should moderate water use in religious ablutions; she would speak up against water waste when at the mosques; she is not free to be wasteful with water even if paying for it.[91]

Other religious beliefs are prescribed but in tension with other religious beliefs. The

[90] For instance, the literature shows how social pressure and social comparison affect prosocial behaviors. Rao (2019) shows how exposure to poor students in India makes wealthy students more charitable by affecting deeply held notions of fairness and generosity. DellaVigna et al. (2012) find that social pressure is an important determinant of giving. In the environmental literature, several papers show that peer effects influence conservation behaviors (Allcott and Rogers, 2014).

[91] All three beliefs are explicitly supported by canonical Islamic sources. See Section 2 for the doctrinal grounding. *Would speak up against waste in mosque* is constructed as a binary indicator equal to one if a woman selected "leaving the tap open while performing ablutions" or "wasting drinking water inside the mosque" as the behavior she would be most likely to speak up against in the mosque. The other options were "not taking off shoes", "praying too loudly", and "dirtying the carpets". Each respondent could select only one option.

clearest case concerns ablutions during dry days when there is a need to preserve water. On the one hand, traditional prescriptions require Muslims to perform standard purification rituals. On the other hand, Islamic sources offer alternatives, such as engaging in dry or shorter ablution rituals or even skipping long ablutions in extremely water-scarce scenarios. The prevalent belief depends on whether more emphasis is given to ritual purity or water preservation in interpreting the religious sources. To measure this, I asked women whether, in the event of water scarcity, they would perform short ablutions (*fard*) or skip long ablutions (*ghusl*).

Finally, some religious beliefs come from recent interpretations of religious texts that depart from long-held prescriptions. I focus on the case of treated water. Given the importance of cleanliness in Islam, treated water has historically been considered undesirable and sometimes unlawful (*haram*). However, as technological advancements now enable the provision of clean and safe treated water, leading Islamic doctrinal centers have issued religious legal rulings (*fatwas*) declaring treated water permissible for all uses, including religious ablutions.[92] I thus asked women if they believe treated water is allowed (*halal*) for all uses.

Figure 8 reports treatment effects (in standard deviations) on these six beliefs.[93] Each outcome measures how much the woman adheres to a specific religious belief. The outcomes on the y-axis have been ordered based on a 1-5 ranking of "How much the norm is supported in the religious canon and sources" from 20 out-of-sample women, where 1 represents "no support" and 5 represents "highly supported".[94]

A clear pattern emerges. Treated women are more likely to hold beliefs that are clearly grounded in the religious canon, shown by the top three outcomes. The treatment does not affect religious beliefs defensible through religious arguments, as shown in the middle of the gradient. Indeed, treated women are not more willing to reduce ablutions

[92]Pioneering was the case of Saudi Arabia, where The Council of Leading Islamic Scholars issued a fatwa in 1978 stating that treated wastewater can be used for ablution and drinking as long as it's safe Farooq and Ansari (1983). In Jordan, a similar fatwa was enacted by The Council of Fatwa, Research, and Islamic Studies, in 2014. Despite the 2014 fatwa, Bolton (2021) reports that 81% of Jordanians considered treated water to be bad in a 2016 survey on attitudes toward alternative water sources.

[93]The x-axis reports treatment effects (in standard deviations) from a regression of each of the outcomes on the y-axis on the treatment indicator as in equation 1

[94]Ranking takes the following values: *Moderation in ablution* (5), *Paying does not allow free use of water* (5), *Would speak up* (4.4), *Would perform short ablution* (3.2), *Would skip ghusl* (2), *Treated water allowed* (1.2). All of the outcomes are recorded at midline. While the decision to span this range was motivated by pre-experiment qualitative evidence, the doctrinal gradient interpretation was developed ex post. To validate it, I returned to the field after observing my effects and elicited the ranking from 20 out-of-sample women. I additionally validated the ranking with 5 out-of-sample religious leaders, obtaining nearly identical results.

on dry days. This result is also consistent with the null effect on water usage in ablutions documented in Table 4, suggesting that treated women are not updating their religious beliefs on ablutions enough to showcase a behavioral change. Most strikingly, treated women are *less* likely than control women to accept treated water as halal, revealing a backlash effect on the most doctrinally novel belief. The coefficient on the bottom outcome shows that, once informed, treated women are less likely to agree that treated water is acceptable. Appendix Table A10 reports related coefficients.

The mixed results on religious beliefs leave a final question: how does religious messaging interact with women's priors? Although I did not elicit baseline priors, I consider women to hold different priors based on how religiously conservative they are. I classify a woman as conservative if she reported at baseline attending the mosque more than once a week, which in Islam is a strong measure of religiosity because women do not have religious obligations to visit the mosque. In Table A11, for each of the outcomes on religious beliefs, I augment the standard specification with an interaction term between conservatism and the treatment indicator. First, the interactions on canonical beliefs are not statistically distinguishable from zero; conservative women respond similarly to others on principles aligned with tradition. Second, they are more likely to accept shortening ablutions on dry days ($p < 0.05$). Third, conservative women are driving the backlash effect on treated water ($p < 0.001$). The pattern of interaction with conservative priors is not trivial. Where the message resolves doctrinal ambiguity in a direction compatible with tradition, religiously committed women update toward conservation. Indeed, performing only the short ablution (*fard*) is recognized as religiously valid by all four major Sunni schools of jurisprudence, a fact of which more conservative women may be more receptive to.[95] Where the message pushes less established arguments, however, the same women resist most strongly. Religious conservatism does not uniformly help or hinder belief change; its effect appears to depend on whether the message aligns with tradition or challenges it.

Social Beliefs. The religious messaging, conveyed in a classroom setting, could reshape beliefs about prevailing views within the women's reference group, even when private views are unchanged. To gauge this, I presented women with a vignette about a certain water-waste norm. In this vignette, a neighbor, when cleaning their house, makes im-

[95]The four obligatory acts of *fard wudu* are derived directly from the Quranic verse: "O you who believe! When you stand up for prayer, wash your faces and your hands up to the elbows, wipe your heads, and wash your feet up to the ankles" (Quran 5:6). Sunnah acts such as the threefold repetition were established by prophetic practice but are not required for validity. See Section 2 for more details.

moderate use of running water. Water abundance is usually associated with wealth in the MENA, and copious use is a way to show off cleanliness and wealth (Bolton (2021); USAID (2018)). I then ask if the neighbor should be considered wealthy, wasteful or clean. In Table 5, column (1), I asked the woman what she believes about this neighbor, where the outcome is 1 if she believes the neighbor to be wasteful. In column (2), I instead asked the woman what she thinks another female neighbour would believe about the neighbor in the vignette, where the outcome is 1 if she believes the other neighbor would consider the vignette one to be wasteful. Interestingly, the treatment does not affect personal views in column (1); the dependent variable's mean is also high (more than 80%), showing that women individually recognize such behavior as wasteful. However, treated women are 13 p.p. more likely ($p < 0.1$) to believe that another neighbor would consider this as wasteful. This suggests that the treatment effectively increased treated women's perceived social stigma surrounding this behavior, rather than individual judgment. Moreover, column (3) reveals that the treatment enhanced the likelihood that women discussed water in social conversations. Such social spillovers could extend beyond the treated women. Column (4) checks for spillovers among control women who reported having heard about water and Islam in the months between the intervention and the endline. Although the sample is small (15 waethats, 129 women) and estimates imprecise, control participants who were exposed to the religious message exhibited similar effects to treated participants on the main variable of water consumption.

Taken together, these results show that religious interventions work by changing religious beliefs, but not all beliefs respond equally.[96] The treatment successfully shifts beliefs that resonate with the existing religious canon. Whether "resonance" reflects a reminder effect, the resolution of doctrinal doubts, or the contextualization of new content within familiar tradition, my data cannot fully distinguish; what is clear is that grounding in tradition is what makes the message effective. The class setting further amplifies the message by influencing norms of social reputation and stigma, an effect that lighter-touch interventions such as religious text messages cannot target (Bursztyn et al., 2019). In contrast, the treatment backfires when pushing doctrinally novel positions, such as treated water adoption, which have only recently been accepted by religious scholars and are thus not supported by tradition. Finally, women do not passively absorb what religious leaders teach; prior beliefs, such as conservative views, shape the process of belief formation

[96]The religious belief effects documented in this section replicate when the analysis is restricted to the endline subsample of women (Appendix Tables A12 and A13). The consistency suggests that the belief mechanism operates in the same population that drives both midline and endline effects.

(Bénabou and Tirole, 2016; Blumenstock et al., 2022).

Robustness. I replicate for the mechanism outcomes the same robustness exercises conducted for the main outcomes in Section 5. I observe no evidence of differential item non-response across treatment arms (Table B6); baseline characteristics do not differ by treatment status in each estimation sample (Table B7); Lee bounds accounting for item non-response preserve the sign and significance of most of the mechanism estimates (Table B8). I also show that the results are robust to alternative inference procedures, including class-level clustering and randomization inference (Table C3), and including all baseline controls (Table C6). A final concern is that the mechanism analysis in Section 6 is measured at midline on the full sample, while endline effects are identified on the endline subsample.[97] To address this, I replicate the mechanisms analyses restricting to the endline subsample. Appendix Tables A12 and A13 show that the mechanism analysis holds in the endline sample. Mechanisms are therefore not specific to the broader midline population but also hold in the endline sample.

7 Religious Leaders' Heterogeneity

The analysis so far has focused on the content of religious messaging, abstracting from the identity of the religious leader by means of waethat fixed-effects. Yet religious messages in the field are not delivered in the abstract, but by trusted local figures whose characteristics and preaching choices may shape impact. Unpacking this messenger dimension is thus essential for understanding how cultural interventions operate in practice. In this section, I bring this dimension back in the analysis. I first document substantial heterogeneity in religious leaders' effectiveness. Then, using audio recordings of the classes, I provide suggestive evidence on which preaching choices, in terms of message content and teaching style, correlate with greater impact. Because leaders' choices of content and style were not randomized, all the patterns documented in this section are descriptive rather than causal in nature.

7.1 Heterogeneity Across Religious Leaders

I start by asking whether religious leaders differ in their effectiveness. I estimate leader-specific treatment effects by interacting the treatment indicator with leader fixed effects:

[97] Aside from the question asking why women saved water in the last three months, which is measured at endline and the social norm vignettes.

$$y_{iwc} = \sum_{w} \delta_w L_w * Treatment_c + \alpha_w + \epsilon_{iwc} \tag{2}$$

where L_w is an indicator for leader w and δ_w is the leader-specific treatment effect. A standard F-test rejects the null of no leader heterogeneity for an index of main outcomes (p-value=0.0045). To account for sampling-error overdispersion in the leader-specific estimates, I implement the Empirical Bayes (EB) procedure of Kline et al. (2020), which produces bias-corrected variance estimates of δ.[98]

Figure 10, Panel (a), reports the distribution of the religious leaders' treatment effects, where the coefficients have been shrunken under assumption of a normal model. Figure A7, in Appendix, reports the original estimates and the shrunken posteriors. The bias-corrected standard deviation of leader treatment effects is approximately 0.23, sizable in light of the school value-added literature, where above .2 is considered high dispersion (Angrist et al., 2017). According to my estimates, moving up one standard deviation in the leader distribution corresponds to a 0.23 standard deviation increase in the index of main outcomes: some leaders are significantly more effective than others. The signal-to-noise ratio is approximately 0.41, indicating that a non-trivial share of the observed dispersion across leaders reflects genuine differences in effectiveness rather than sampling noise.

What might explain this dispersion? Although I cannot identify the causal effect of leader characteristics from the experimental design, audio recordings of all 19 treatment classes allow me to document patterns in message content and teaching style that correlate with greater leader effectiveness.

Message Content. The training covered six religious concepts related to water in Islam: *Blessing*, *Sin*, *Stewardship*, *Ownership*, *Practice*, and *Women's Role* (see Section 2 and 3). Each leader chose how to structure her class, leading to variation in which concepts were emphasized. I relate these content choices with treatment effects by estimating:

[98] Because each leader is observed across only a small number of women, estimates of δ may contain finite-sample bias. This may lead to some chance of getting an overdispersed δ from equation 2, even if there is no actual dispersion in leaders effect. The EB procedure corrects for this by separating signal from noise.

$$y_{iwc} = \eta_w + \eta_1 Blessing_c + \eta_2 Sin_c + \eta_3 Stewardship_c + \\ \eta_4 Ownrship_c + \eta_5 Practice_c + \eta_6 RoleWomen_c + \epsilon_{iwc} \tag{3}$$

where the main independent variables are six mutually exclusive indicator variables for the main concept discussed by the religious leader, identified as the concept with the largest share of sentences in the class.[99] Alternatively, I estimate the same specification with six continuous variables for the share of sentences in the class belonging to each of the six concepts. Notably, I make no causality claim since the religious leaders' choice of class content was not guided.

Figure 9 shows results from equation 3. Panel (a) presents coefficients on the six continuous variables, and Panel (b) presents coefficients on the six indicator variables. The dependent variables are my main outcome measures (namely *Individual Donation*, *Collective Donation*, and *Water Consumption*), and an index of all outcomes (*Index*).[100] All the outcomes have been standardized on the same scale. Therefore, a positive coefficient indicates successful results of the treatment. To build the index, I follow Anderson (2008) and account for the covariance structure in the components, demean and normalize by the standard deviation of the index in the control group to ease interpretation.[101]

Panels (a) and (b) of Figure 9 both show that classes emphasizing *Stewardship*, *Blessing* and *Sin* are associated with the largest treatment effects across all four outcomes. Together, these three concepts share a common theological framing that stresses moral responsibility: water is a gift deserving gratitude, entrusted to human stewardship, and whose waste constitutes sin. By contrast, *Practice*, *Ownership*, and *Women Role* engage water on a more tangible aspect of religion, addressing day-to-day practices, property rights, and gender roles; all three show null to negative associations. Interestingly, *Practice* includes the controversial topic of treated water, which caused backlash as documented in Section 6. *Ownership* correlates negatively with water savings, possibly because the religious framing that water is a communal good available to all sits uneasily with conservation. *Women Role* shows negative effects, revealing a tension between water-conservation efforts and traditional gender roles. Indeed, women may have found a contradiction between their responsibility for household care, requiring abundant water, and

[99] These indicators equal zero for the control, non-water, religious classes, which form the omitted category. The coefficients therefore measure differences in outcomes between attending a water class centered on a given topic and attending a non-water religious class, within the same religious leader.

[100] I do not include *Water Expenditure* which is just a transformation of the water consumption measure.

[101] Table A14, in Appendix, shows coefficients corresponding to the results shown in Figure 9.

their responsibility to preserve a scarce but domestically needed resource.

Teaching Style. Beyond content, leaders also varied in how they delivered their classes. From the audio recordings, coders were asked to assess the following aspects of a leader's teaching style: *Positive* if she had an encouraging style, instead of relying on admonitions and warnings; *Quran* if she relied extensively on Quranic sources, instead of other religious ones; *Religious Models* if she referred to religious role models, such as the Prophet and renowned Islamic scholars, instead of secular ones, such as early Islamic communities, pious historical figures, and tribal ancestors; *Participatory* if she engaged the class with a bottom-up, dialogic approach rather than a top-down, frontal approach. Therefore, I estimate:

$$y_{iwc} = \gamma_w + \gamma_1 Treatment_c + \gamma_s TeachingStyle_w^s * Treatment_c + \epsilon_{iwc} \tag{4}$$

Here, y_{iwc} is the outcome of interest for woman i. $TeachingStyle_w^s$ is an indicator variable for a given teaching style s among the ones described above.

Table 6 shows the results. The dependent variable is the above index of my main real outcomes, namely *Individual Donation*, *Collective Donation*, and *Water Consumption*, where all the outcomes have been standardized on the same scale following Anderson (2008). Therefore, a positive coefficient indicates effective results of the treatment. Most successful waethats relied on religious role models and adopted a participatory approach to engage women.[102]

Can the content analysis explain part of the leader heterogeneity? To answer this, I create an index of the strongest predictors of leaders' effectiveness in the content analysis, namely *Blessing*, *Stewardship*, and *Sin* for message content, and *Religious Models* and *Participatory* for teaching style. Figure 10, Panel (b), associates this index with the shrunken leader treatment effects. About one quarter of the observed variation in religious leaders' efficacy is explained by which messages they chose to deliver and their style of conducting the class ($R^2 = 0.29$; adjusted $R^2 = 0.25$). Although these correlations are descriptive, they suggest that largest effects come from leaders who gave a theological framing to water use rather than emphasizing the details of ritual practice, and who adopted an interactive teaching style. Therefore, leader selection, engagement, and training may play a key role in the design of successful religious interventions.

[102] Table A15, in Appendix, report results for each outcome separately.

8 Replicability and Cost-Effectiveness

My intervention builds on existing religious institutions, easing its replicability and scaling. First, waethats' classes are regularly attended by Jordanian women, so this infrastructure is ready to be activated for policy purposes. Indeed, in this study the selected waethats were already conducting their weekly classes with groups of women; classes were not created for the purpose of the experiment. Moreover, in Jordan, waethats get periodic training on religious topics from the Ministry of Islamic Affairs and Awqaf.[103] In this case, the waethats were trained on the relationship between water and Islam.

I estimate an administrative cost of $0.25 per woman: each religious leader received $10 for a one-day training session and transportation compensation, and taught two classes (treatment and control) comprising approximately 20 women each.[104] The per-woman cost is modest relative to a waethat's monthly stipend ($423 - $564). I consider the opportunity cost for the waethats to be null, since they delivered the experimental classes within their regular workday on request of their employer, the Ministry of Islamic Affairs. To calculate the opportunity costs for participants, I use the average monthly female income from ILOSTAT 2022 ($503 per month; $2.62 per hour, assuming forty-eight hours of work per week, (ILOSTAT, 2026)) and weight it by the share of employed women in my sample (6%), reflecting low female labor force participation in Jordan. I overestimate the amount of time dedicated to the class as 3 hours, when on average participants spent 1.7 hours in the program. The opportunity cost for women computed in this way amounts to $0.47, and the total costs per woman amounts to $0.72. My treatment estimates indicate that treated households saved $4.51 on their water bill in a three-month period. Based on the above back-of-the-envelope calculations, and under the conservative assumption that effects do not persist beyond a three-month horizon, I estimate a benefit-cost ratio of 6.26.

What would the aggregate benefit be if we expanded the intervention at the country level? Using administrative data from the Ministry of Islamic Affairs on attendance at waethats' classes, I estimate the potential aggregate impact of scaling up the intervention nationally. Between 24 and 42 percent of Jordanian women attend such classes. Since the treatment effect is measured at the household level, I convert attending women into households reached using the average of 2.27 women per household. This yields approx-

[103] Indeed, waethats are not religious experts but pious women who educate themselves on religious matters and rely on Awqaf for comprehensive training and materials. Awqaf provides training on specific topics to advance its policy agenda.

[104] For conversion, I use the exchange rate as of August 2022.

imately 0.58–1.02 million households reached, and a reduction of 2.8–4.9 million cubic meters of water over the three-month period following the intervention.[105] The amount of water saved in one quarter would suffice to cover the yearly water needs of roughly 80,000–270,000 individuals.[106]

Therefore, my intervention generates large effects in a scalable fashion since such mosque-based programs rely on a preexisting infrastructure, teach a well-understood and well-developed set of values, and rely on religious agents that are trusted and respected by the local community.

9 Conclusions

In this paper, I investigated whether explicit cultural systems, in particular religion, can induce behavioral change. I showed that religious beliefs can be harnessed to promote pro-environmental behaviors regarding adaptation to water scarcity in MENA, a region particularly exposed to rising water scarcity. I conducted an RCT with women attending religious classes led by religious leaders in Jordan. Treated women received religious messaging on water preservation in Islam, while control women received messaging on another religious topic. The treatment increased donations to a water charity, and eventually decreased women's water consumption from water bills. The cutback in water consumption was driven by high-usage households, and it was accomplished by a reduction in water-intensive household chores.

The treatment worked by affecting religious beliefs about water. However, the treatment did not modify all these beliefs in the same way. It affected religious views on water that are clearly rooted in religious sources, while it triggered backlash against new interpretation of long-established norms. This suggests a complex interplay between religious messaging and individuals' pre-existing beliefs. Finally, content analysis of class recordings revealed that religious leaders were most effective when emphasizing concepts

[105] The calculation proceeds as follows. The Department of Statistics Population Division ("Estimated Population of the Kingdom by Governorate, Locality, Sex and Household, 2025") reports 5,617,100 women and 2,475,767 households, implying 2.27 women per household. Applying the Ministry of Islamic Affairs attendance range of 24–42% to the female population and converting to households at this ratio yields 0.58–1.02 million households reached. Multiplying by the household-level treatment effect of 4.8 cubic meters over three months gives 2.8–4.9 million cubic meters. This counts the effect once per household and is therefore a lower bound.

[106] The World Health Organization estimates that 50–100 liters of water per day is needed to ensure that most basic needs are met and few health concerns arise, corresponding to 18.25–36.5 cubic meters per person per year. This back-of-the-envelope calculation assumes persistence of effects over the three-month horizon only.

of moral responsibility over ritualistic practice and when adopting an interactive teaching style.

This paper contributes to research on the role of culture in shaping development policy, in particular regarding resource conservation. My results underscore the power of religion as a catalyst for shaping behaviors through interventions that target deep-seated beliefs. This also highlights the key role of beliefs in adapting to climate change, a global priority. Indeed, adaptation to climate change in the developing world will require sustained changes in private behavior that prices and information campaigns have so far struggled to deliver; religious institutions offer an existing, trusted, and low-cost delivery infrastructure for policy.

Future research could push further into two open questions. First, leader effects are sizable, and understanding what makes a religious leader persuasive would inform how religious messaging interventions scale. Second, the asymmetry between accepted and contested beliefs raises the question of whether backlash weakens with repeated exposure or other levers, such as endorsement by higher ranking religious authorities. Answering these questions would shed further light on how to design cultural interventions, and on how cultures themselves change.

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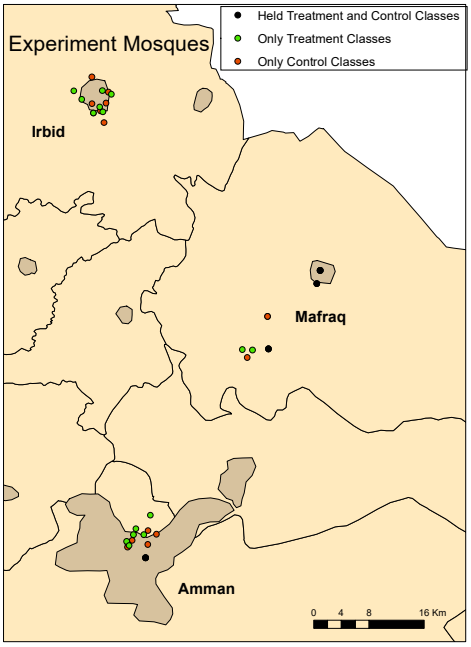
Figures and Tables

Figure 1. Experiment Location

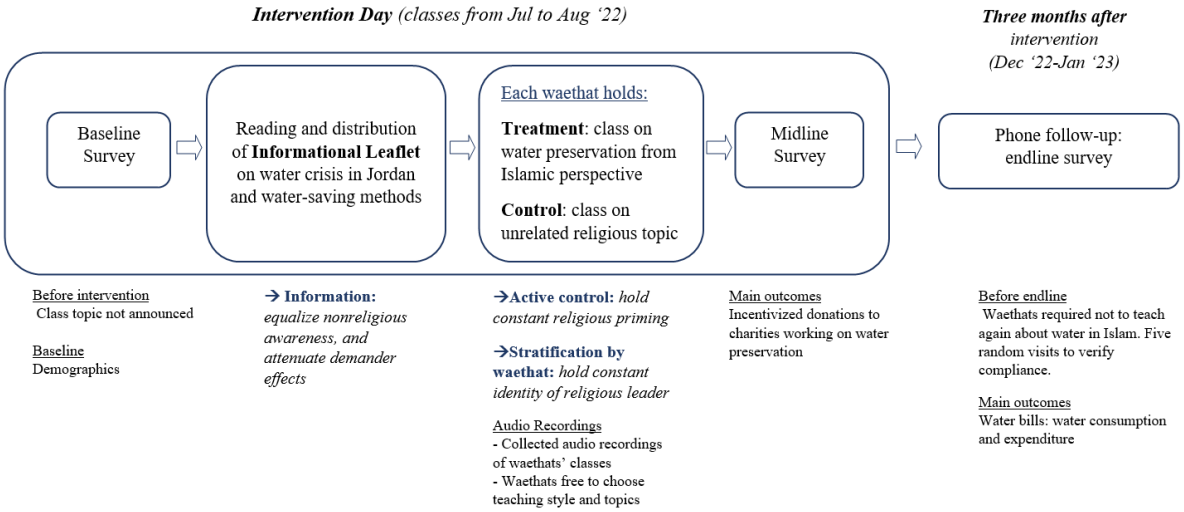
(a) Selected Areas

(b) Selected Mosques



Note: The maps show the locations of the selected areas and mosques. Panel (a) shows Jordan and highlights in green the main cities of the governorates of Amman, Mafraq, and Irbid, where the study took place. Panel (b) zooms into the three areas; points mark the mosques where classes were held.

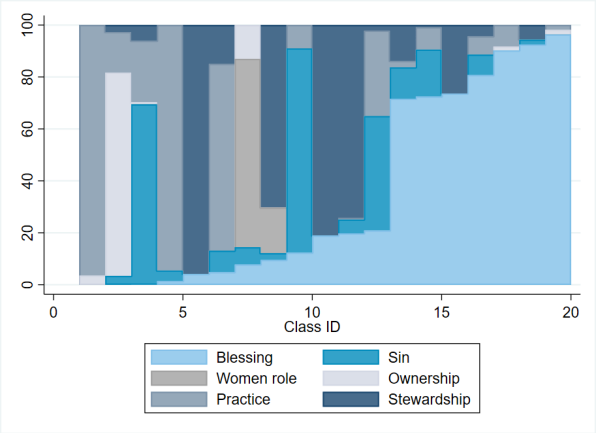
Figure 2. Experiment Timeline



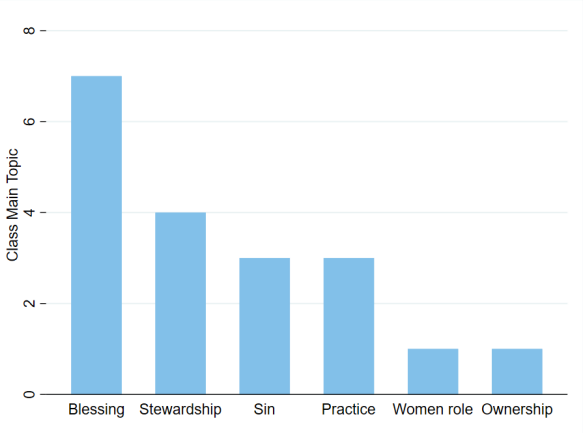
Note: This figure summarizes the study timeline. Boxes show the sequence of activities; classes were held between July and August 2022, and the endline phone survey was conducted in December 2022–January 2023, collecting water bills covering the three months following the intervention. The bullets beneath each box report either the key variables measured in that step (underlined), or the design features embedded in it (arrows).

Figure 3. Class Content from Audio Recordings

(a) Coded Class Content



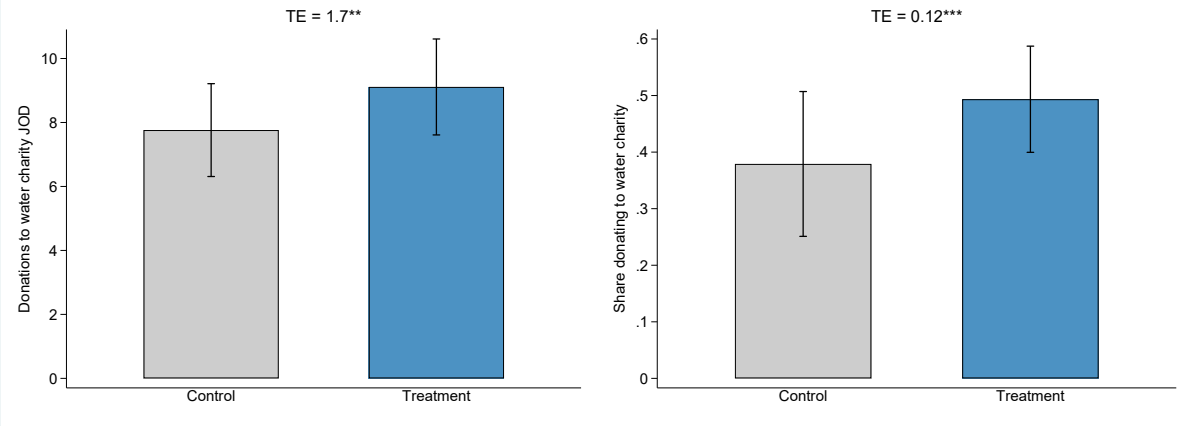
(b) Main Concept Discussed in Class



Note: These figures provide a graphical description of the main concepts discussed in the treatment classes on water from an Islamic perspective. Panel (a) represents the raw content discussed in the 19 treatment classes computed using the scripts data from class recordings, grouped into the six major concepts associated with water and Islam: *Blessing*, *Stewardship*, *Sin*, *Ownership*, *Practice*, *Women Role*. Each unit on the x-axis represents a class. The vertical axis represents the share of sentences belonging to each concept discussed in a class. Panel (b) shows the distribution of the main concept discussed in each class, identified as the concept presenting the largest share of sentences in the class.

Figure 4. Effect of the Treatment on Donations to a Water Charity

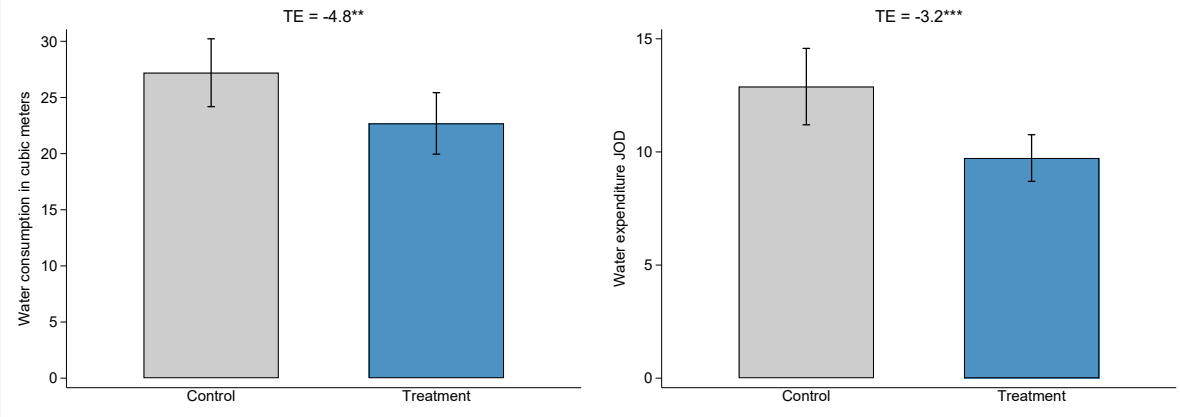
(a) *Individual Donation* (b) *Collective Donation*



Note: This figure plots group means with 95% confidence intervals by treatment status. In panel (a), *Individual Donation* measures how much of a 15 JOD endowment, provided by the research team, a woman chose to donate to a water charity. In panel (b), *Collective Donation* is a dummy for whether the woman chose a water charity over alternative charities to receive a 700 JOD donation on behalf of her class. The treatment effect reported above each panel is estimated from a regression including religious-leader fixed effects, with standard errors bootstrap-clustered at the pair (religious-leader) level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024). $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Figure 5. Effect of the Treatment on Water Usage

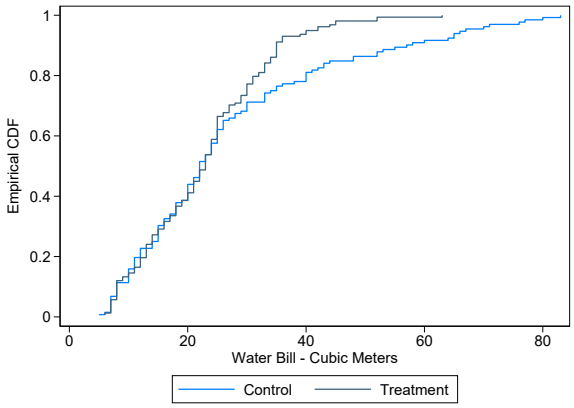
(a) *Water Consumption* (b) *Water Expenditure*



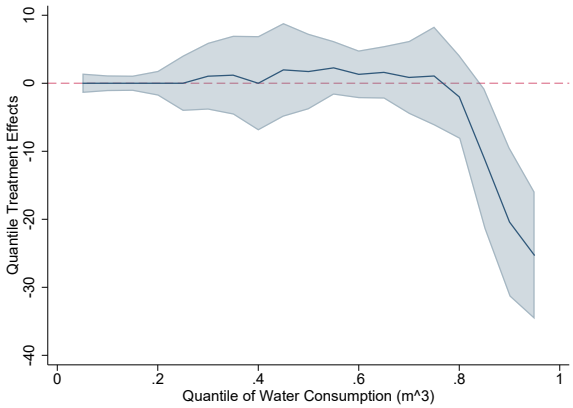
Note: This figure plots group means with 95% confidence intervals by treatment status. In panel (a), *Water Consumption* refers to the amount of water, in cubic meters, consumed by the household in the last quarter. In panel (b), *Water Expenditure* is the water bill amount due in Jordanian Dinars. The treatment effect reported above each panel is estimated from a regression including religious-leader fixed effects, with standard errors bootstrap-clustered at the pair (religious-leader) level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024). $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Figure 6. Quantile Treatment Effects of the Treatment on Water Consumption

(a) CDF of Water Consumption

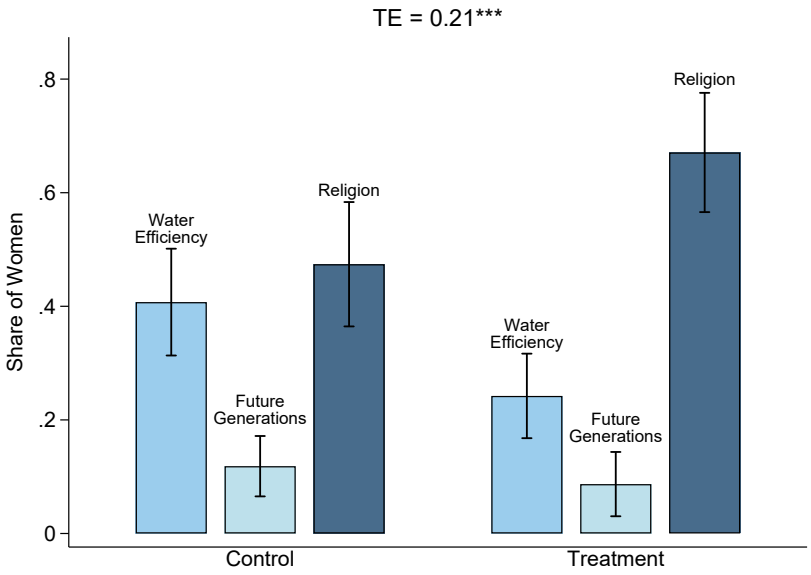


(b) QTE on Water Consumption



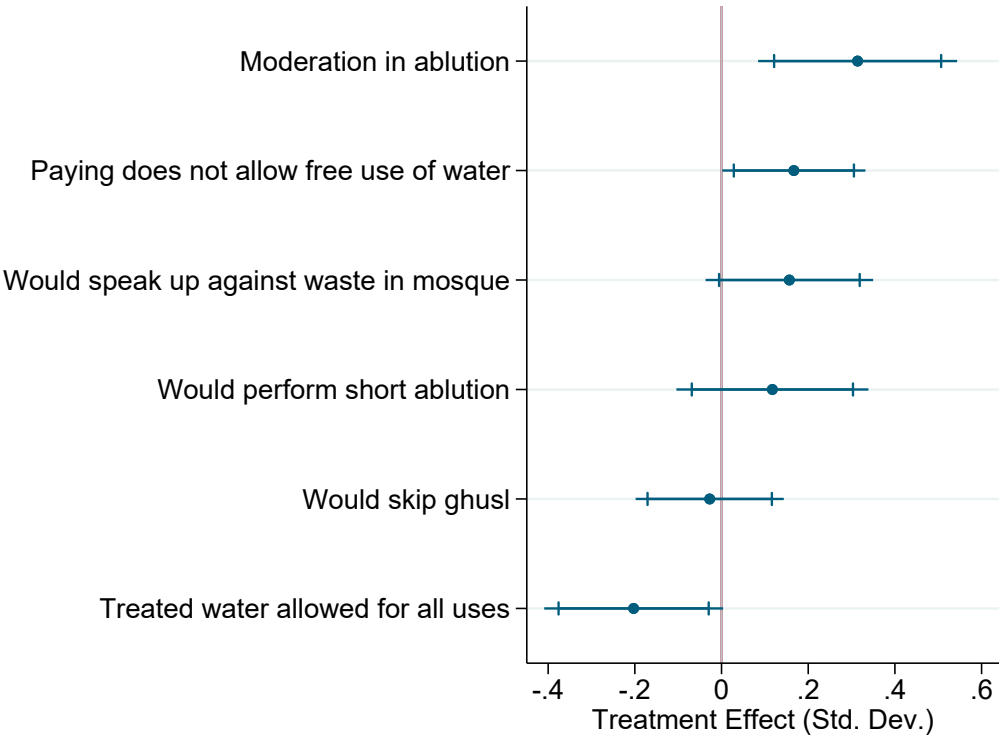
Note: Panel (a) shows the empirical cumulative distribution functions of household water consumption by treatment status. A Kolmogorov-Smirnov test rejects the null that the two samples come from the same distribution at the 5% level. Panel (b) shows quantile treatment effects (QTEs) of the treatment on water consumption, absorbing religious-leader fixed effects. Shaded areas are 95% confidence intervals bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).

Figure 7. Effect of the Treatment on Primary Reasons for Saving Water



Note: This figure shows the share of women reporting the following primary reason for saving water, by treatment status: environment ("save water to be more water efficient"), morality ("save water for future generations"), or religion ("save water to be religiously pious"). Confidence intervals shown are at the 95% level. The treatment effect reported above the bars is estimated from equation 1, where the dependent variable equals 1 if the woman cited the religious reason; the regression includes religious-leader fixed effects. Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).
*p<0.10,**p<0.05,***p<0.01

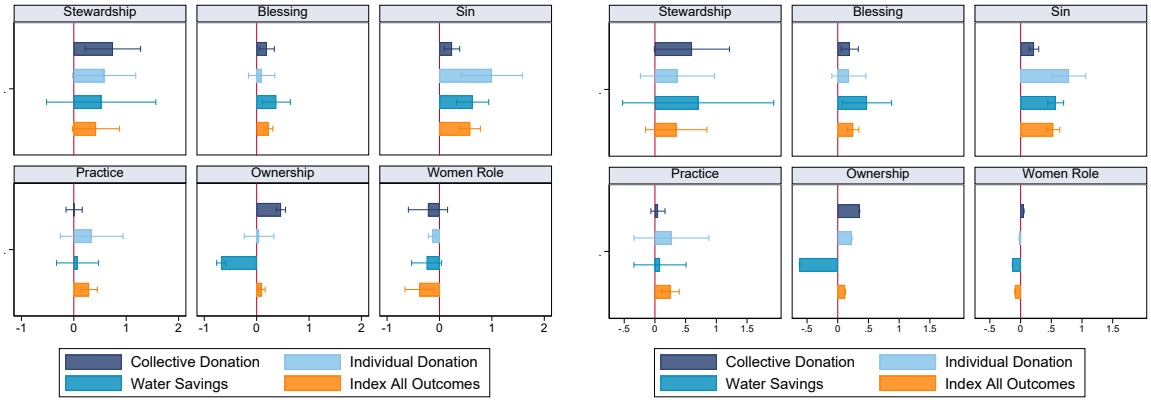
Figure 8. Effect of the Treatment on Religious Beliefs



Note: This figure shows estimated treatment effects on water-related religious beliefs from equation 1, which includes religious-leader fixed effects. Outcomes are measured as z-scores, so effects are in standard-deviation units. Each outcome represents agreement with a statement, defined top to bottom as follows: individuals should moderate water use when cleansing before prayers; the respondent is not free to be wasteful with water even if she paid for it; the respondent would speak up if she saw someone wasting water at the mosque; when water is scarce, respondent would perform a shorter ablution; when water is scarce, the respondent would skip the long ablution before Friday prayer; water treated for reuse is acceptable in most uses, even ablutions. Outcomes on the y-axis have been ordered based on average rating of how much each norm is supported in the religious canon and sources (1 = no support, 5 = highly supported), elicitied from 20 out-of-sample women. Horizontal lines represent 95% confidence intervals; inner tick marks indicate 90% confidence intervals. Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).

Figure 9. Differential Effect of Class Content on Main Outcomes

(a) Continuous Vars: All Concepts Discussed (b) Indicator Vars: Main Concept Discussed

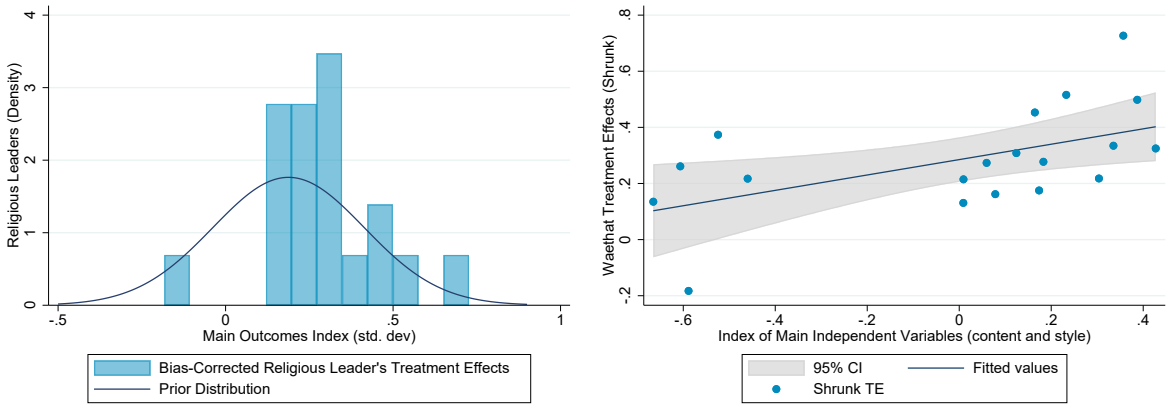


Note: This figures show differential effects of the concepts discussed in the treatment class on the main outcomes (*Individual Donation*, *Collective Donation*, *Water Consumption*) and an index of all outcomes constructed following Anderson (2008). Effects are estimated from equation 3, which includes religious-leader fixed effects. All outcomes are standardized. The concepts are: *Blessing*, *Sin*, *Stewardship* , *Ownership*, *Practice*, and *Women Role*. Panel (a) shows effects from a regression of the outcomes over six continuous variables measuring the share of sentences belonging to each concept discussed in the class. Panel (b) shows effects from a regression of the outcomes on six mutually exclusive indicators for the main concept discussed in each class, defined as the concept with the largest share of sentences. Horizontal lines represent 95% confidence intervals, with standard errors bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).

Figure 10. Religious Leaders' Heterogeneity and its Predictors

(a) Empirical Bayes Estimates of Leader-Specific Treatment Effects

(b) Predictors of Religious Leaders' Heterogeneity



Note: The figure shows heterogeneity in treatment effects across religious leaders and its predictors. Panel (a) plots the distribution of Empirical Bayes (shrunken) estimates of leader-specific treatment effects on the index of main outcomes; the overlaid normal curve uses the estimated mean and the noise-corrected standard deviation of the effect distribution. Panel (b) plots the shrunken leader-specific treatment effects against an index of class content and teaching style, constructed following Anderson (2008) from the dimensions positively associated with treatment effects in the content analysis: the shares of class content devoted to *Blessing*, *Sin* and *Stewardship* and indicators for *Religious Models* and *Participatory* teaching style. The line is the linear fit with its 95% confidence interval.

Table 1. Balance of Baseline Characteristics: Baseline and Endline Samples

	Baseline Sample			Endline Sample		
	Control	Treatment	Difference	Control	Treatment	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Socio-Economic Characteristics						
Age	45.861	45.727	0.306	46.970	46.018	0.200
	(14.136)	(12.868)	(0.820)	(13.235)	(12.202)	(0.905)
Ever married	0.866	0.897	0.044	0.902	0.920	0.018
	(0.342)	(0.304)	(0.305)	(0.298)	(0.273)	(0.527)
N. children	2.349	2.491	0.202	2.488	2.474	-0.083
	(1.981)	(1.756)	(0.333)	(2.086)	(1.844)	(0.790)
Primary	0.177	0.177	-0.014	0.193	0.170	-0.043
	(0.382)	(0.382)	(0.663)	(0.396)	(0.377)	(0.292)
High school	0.493	0.488	0.007	0.541	0.485	-0.053
	(0.501)	(0.501)	(0.909)	(0.500)	(0.501)	(0.488)
University	0.215	0.190	-0.019	0.178	0.200	0.042
	(0.412)	(0.393)	(0.668)	(0.384)	(0.401)	(0.470)
Refugee	0.214	0.216	-0.024	0.218	0.228	-0.016
	(0.419)	(0.412)	(0.550)	(0.434)	(0.421)	(0.736)
Urban	0.748	0.756	-0.018	0.789	0.837	0.004
	(0.435)	(0.430)	(0.661)	(0.410)	(0.371)	(0.915)
HH. size	4.950	5.204	0.231	5.148	4.945	-0.231
	(2.191)	(2.300)	(0.293)	(2.228)	(2.361)	(0.533)
PCA wealth	0.076	-0.069	-0.084	-0.205	-0.353	-0.059
	(1.682)	(1.687)	(0.625)	(1.679)	(1.588)	(0.781)
Employed	0.060	0.063	0.005	0.063	0.057	-0.001
	(0.238)	(0.242)	(0.855)	(0.244)	(0.233)	(0.974)
Panel B: Water Availability						
Number of waterdays	1.375	1.316	-0.054	1.504	1.382	-0.104
	(0.776)	(0.619)	(0.301)	(0.905)	(0.557)	(0.243)
Weekly water just enough	0.480	0.483	0.011	0.523	0.487	-0.041
	(0.500)	(0.500)	(0.777)	(0.501)	(0.501)	(0.579)
Water access issue	0.507	0.495	-0.036	0.534	0.525	-0.031
	(0.501)	(0.501)	(0.448)	(0.501)	(0.501)	(0.732)
Water consumption	26.594	29.032	2.031	26.956	29.392	1.193
	(15.992)	(17.718)	(0.233)	(16.753)	(17.077)	(0.687)
N. tanks	1.974	1.906	-0.044	1.927	1.752	-0.118
	(0.990)	(0.936)	(0.740)	(1.090)	(0.847)	(0.523)
Panel C: Values and Religiosity						
Trust others	0.184	0.169	-0.014	0.163	0.163	0.020
	(0.388)	(0.375)	(0.709)	(0.371)	(0.371)	(0.687)
Advise monthly with rel. leader	0.177	0.197	0.018	0.168	0.159	-0.009
	(0.382)	(0.398)	(0.623)	(0.375)	(0.367)	(0.844)
Change mind frequently	0.204	0.257	0.042	0.218	0.232	0.010
	(0.403)	(0.437)	(0.214)	(0.414)	(0.423)	(0.837)
Attend mosque more than weekly	0.512	0.544	0.021	0.577	0.565	0.074
	(0.501)	(0.499)	(0.726)	(0.496)	(0.497)	(0.309)
Observations	339	373	712	135	165	300

Note: The table reports sample means with standard deviations in parentheses. Columns (1)–(3) refer to the baseline sample; columns (4)–(6) refer to the endline sample, randomly selected among women who provided a phone number at baseline. Columns (3) and (6) report the difference in means, estimated from OLS regressions of each characteristic on treatment including religious-leader fixed effects, with p-values in parentheses based on standard errors clustered at the religious-leader level. All characteristics are measured at baseline: Panel A reports socio-economic characteristics; Panel B, water availability; Panel C, values and religiosity. The wealth index is the first principal component of indicators for ownership of 11 household assets. *p<0.10,**p<0.05,***p<0.01.

Table 2. Treatment Effects on Donations to a Water Charity

Donations - Short Run

	Individual Donation *JOD*		Collective Donation *share*	
	(1)	(2)	(3)	(4)
Treatment	1.3*	1.7***	.11***	.12***
	(.77)	(.59)	(.036)	(.029)
Obs	431	431	583	583
Clusters	19	19	19	19
Mean	7.8	7.8	.38	.38
Waethat FE	No	Yes	No	Yes

Note: The table shows estimated treatment effects on the midline outcomes from equation 1. Columns (2) and (4) include religious-leader fixed effects, corresponding to the randomization strata; columns (1) and (3) omit them. All outcomes are measured at midline, immediately after the intervention class. In columns (1) and (2), *Individual Donation* is the amount, out of a 15 JOD endowment provided by the research team, that a woman chose to donate to a water charity. In columns (3) and (4), *Collective Donation* is an indicator equal to one if the woman chose a water charity over alternative charities to receive a 700 Jordanian Dinar (JOD) donation on behalf of her class. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Table 3. Treatment Effects on Water Usage

Water Usage - Medium Run

	Water Bill				Days Without Water	
	Consumption (m^3)		Expenditure (JOD)			
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-4.5**	-4.8**	-3.2***	-3.2***	-.22	-.36*
	(2.2)	(1.96)	(1.02)	(.88)	(.17)	(.19)
Obs	290	290	290	290	298	298
Clusters	19	19	19	19	19	19
Mean	27	27	13	13	.62	.62
Waethat FE	No	Yes	No	Yes	No	Yes

Note: The table shows estimated treatment effects on the three endline outcomes from equation 1. Columns (2), (4), and (6) include religious-leader fixed effects, corresponding to the randomization strata; columns (1), (3), and (5) omit them. All outcomes are measured at endline, three months after the end of the intervention. In columns (1) and (2), *Water Consumption* is the household's quarterly water consumption in cubic meters, as recorded on the water bill. In columns (3) and (4), *Water Expenditure* is the amount due on the water bill, in Jordanian Dinars (JOD). In columns (5) and (6), *Days Without Water* is the number of days the household was without water in the last month. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses , following De Chaisemartin and Ramirez-Cuellar (2024).*p<0.10,**p<0.05,***p<0.01

Table 4. Treatment Effects on Water-Related Behaviors in the House

	Water-Related Behaviors								
	Shower		Wudu		House cleaning		Laundry		Adoption
	times	*minutes*	*times*	*minutes*	*times*	*minutes*	*times*	*minutes*	*saving methods*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment	-.27*	-.24	.52	.026	-.19	-5.3**	-.25	7.6***	.14**
	(.14)	(.95)	(1.1)	(.11)	(.34)	(2.1)	(.19)	(2.7)	(.066)
Obs	296	295	298	298	298	298	298	298	245
Clusters	19	19	19	19	19	19	19	19	19
Mean	2.9	13	30	1.6	3.1	21	2.6	43	.65
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table shows estimated treatment effects on endline water-related behaviors from equation 1. All regressions include religious-leader fixed effects. For each behavior, *times* is the number of times the woman performed the activity in the last seven days, while *minutes* is the time, in minutes, she spent in the most recent occurrence of the activity. In columns (3) and (4), *Wudu* refers to the short ritual cleansing before prayer. In column (9), *Adoption* is a indicator equal to one if the woman reported having used any water-saving method in the last three months. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Table 5. Treatment Effects on Social Beliefs on Water and Spillovers

	Mechanisms - Social Beliefs			
	Water waste		Sharing	Water
	Individual norm	*Social norm*	Water Info	Consumption
	(1)	(2)	(3)	(4)
Treatment	-.0079	.13*	.11*	-2.9
	(.037)	(.074)	(.063)	(6.9)
Obs	295	295	298	129
Clusters	19	19	19	15
Mean	.89	.59	.4	27
Waethat FE	Yes	Yes	Yes	Yes

Note: The table shows estimated treatment effects on water-related social beliefs in equation 1; all regressions include religious-leader fixed effects. In columns (1) to (3), outcomes are indicators equal to one if the woman agrees with the following statements. *Individual Norm*: the woman herself judges a vignette neighbor who uses abundant water to clean her house to be wasteful, rather than clean or wealthy. *Social Norm*: the woman believes that one of her neighbors would judge the vignette neighbor to be wasteful, rather than clean or wealthy. *Sharing Water Info*: the woman reports that water management is a frequent topic of discussion in her social network. Column (4) reports a spillover analysis estimated on control women only: treated women are those who reported at endline having heard about water and Islam; the outcome is *Water Consumption*, the household's quarterly consumption in cubic meters as recorded on the water bill. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

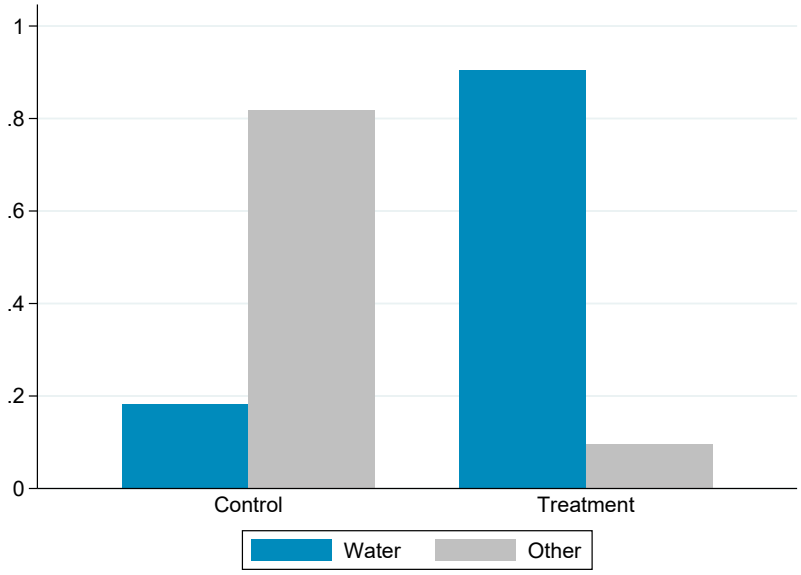
Table 6. Heterogeneous Effects by Religious Leaders' Teaching Style

	Heterogeneous Effects *Teaching Style*			
	Index of Main Outcomes			
	(1)	(2)	(3)	(4)
Treatment	.45***	.3***	.21***	.21***
	(.13)	(.076)	(.075)	(.05)
Treatment× Positive	-.22			
	(.14)			
Treatment × Quran		-.043		
		(.097)		
Treatment × Religious Models			.16*	
			(.094)	
Treatment × Participatory				.29***
				(.11)
Obs	650	650	650	650
Clusters	19	19	19	19
Mean	-.16	-.16	-.16	-.16
Waethat FE	Yes	Yes	Yes	Yes

Note: The table shows heterogeneous treatment effects by the teaching style of the religious leader, from equation 4; all regressions include religious-leader fixed effects. Because teaching style does not vary within leader, its main effect is absorbed by the fixed effects. The outcome is a index of the main outcomes (*Individual Donation*, *Collective Donation*, *Water Consumption*, the latter reversed so that all are on the same scale), with components standardized using control-group means and standard deviations (Anderson, 2008). All interacted variables are indicators equal to one if the leader: has an encouraging tone rather than relying on admonitions and warnings (*Positive*); relies extensively on Quranic rather than other religious sources (*Quran*); refers mainly to religious rather than secular role models (*Religious Models*); engages the class through a bottom-up, dialogic rather than top-down, frontal approach (*Participatory*). The control-group mean of the index is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Appendix A Additional Figures and Tables

Figure A1. Share of Sentences about Water vs. Any Other Topic



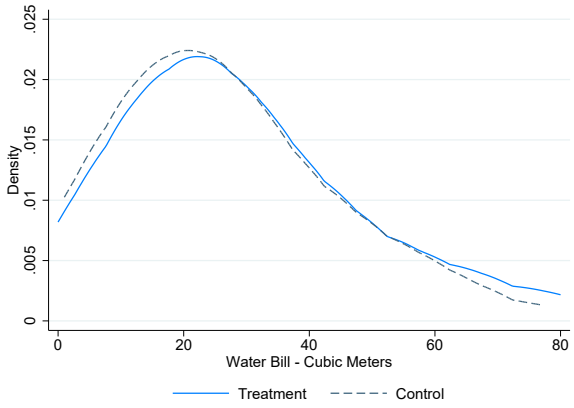
Note: This figure plots the share of sentences devoted to water versus any other topic (residual category), averaged across the 19 treatment and 19 control classes. Shares are computed from audio recordings of the classes. The figure confirms that treated classes focused on water-related content, while the nonzero water share in control classes reflects the nonreligious water-conservation information delivered in both experimental arms.

Figure A2. Example of collected water bill

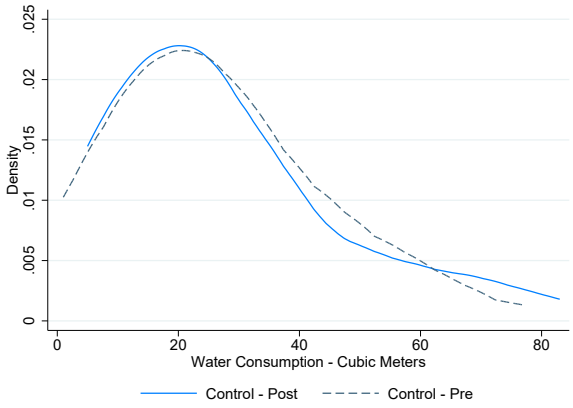
Note: This figure shows an example of a water bill collected from study participants. Black boxes redact the subscriber's identifying information. The two yellow-highlighted fields indicate the information extracted for the analysis: total water consumption in cubic meters (23 cubic meters in this example) and the total amount due in Jordanian dinars (8.750 dinars).

Figure A3. Distribution of Water Consumption

(a) Baseline (Treatment vs. Control)

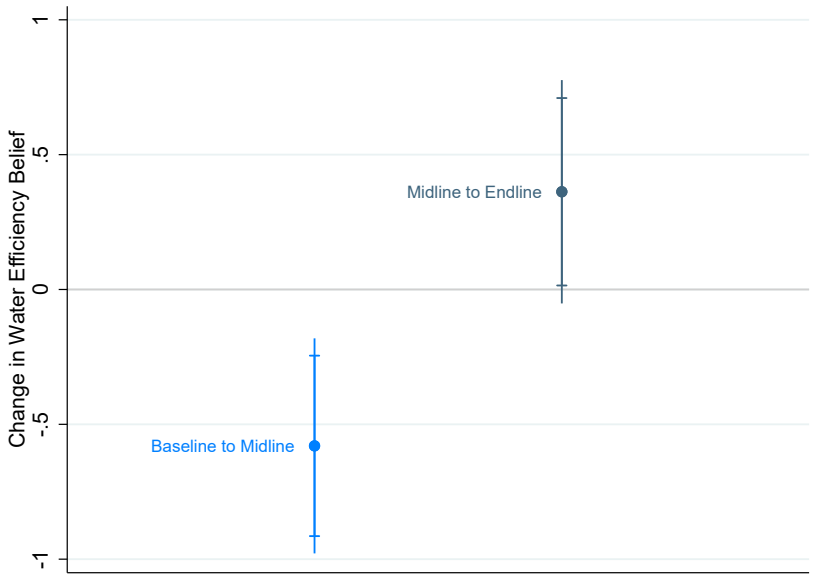


(b) Pre-Post Distribution (Control)



Note: Both panels report kernel density estimates of household water consumption. Panel (a) compares treatment and control households' water consumption at baseline. Exact Kolmogorov-Smirnov test fails to reject equality of the two distributions at the 1% level (p = 0.73). Panel (b) compares baseline and endline water consumption among control households. The Wilcoxon signed-rank test fails to reject equality at the 1% level (p = 0.35).

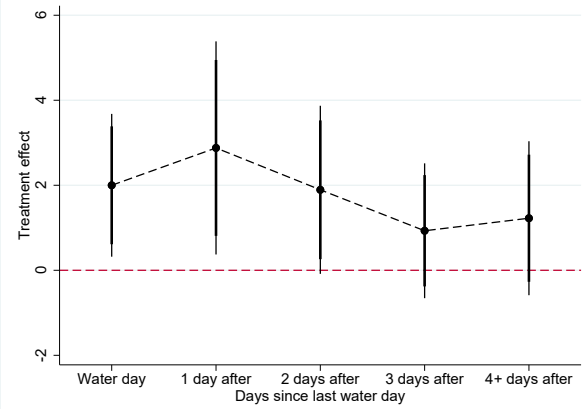
Figure A4. Change in Perceptions about Own Water Efficiency between Survey Rounds



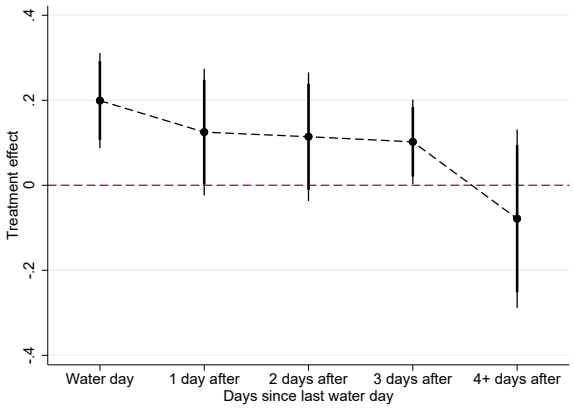
Note: This figure shows estimated treatment effects on changes in self-assessed water efficiency from equation 1; all regressions includes religious-leader fixed effects. The outcome is the woman's self-assessed efficiency in managing water at home, on a 1–7 scale; each coefficient is the treatment effect on the change between two survey rounds. The left coefficient refers to the change between baseline (immediately before the class) and midline (immediately after the class); the right coefficient to the change between midline and endline (three months after the intervention). Inner and outer intervals represent 90% and 95% confidence levels, respectively. Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).

Figure A5. Heterogeneous Treatment Effects by Distance from Last Water Day

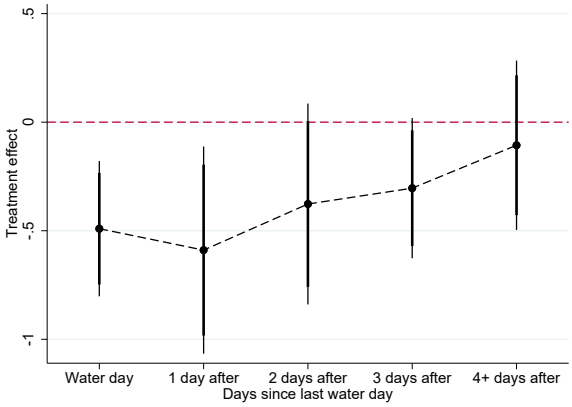
(a) Individual Donation (JOD)



(b) Collective Donation (p.p)

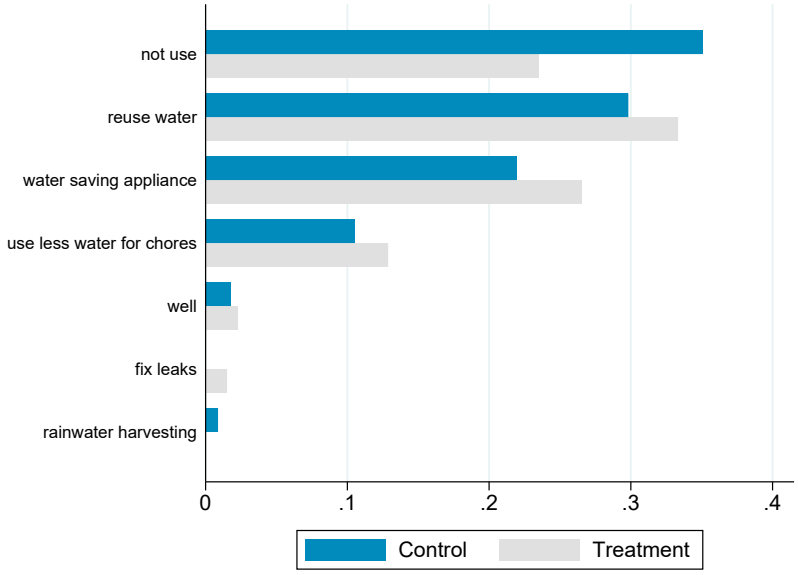


(c) Updated Beliefs (Δ)



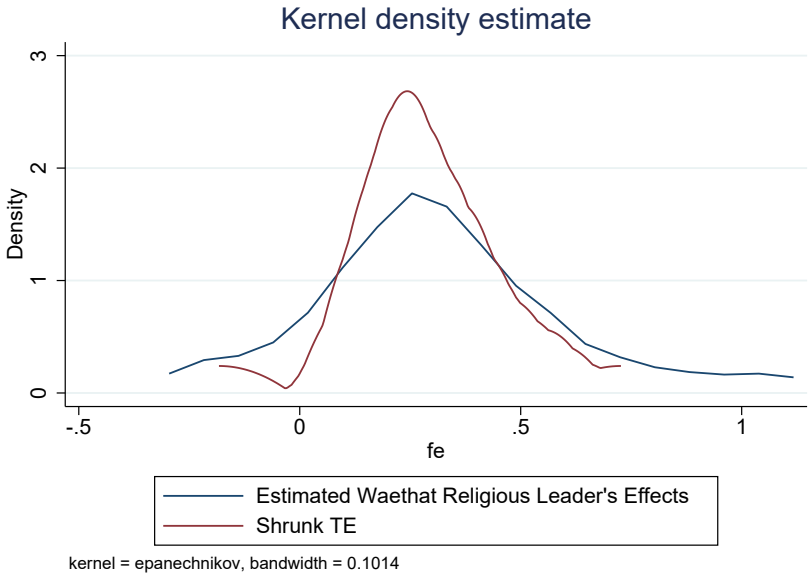
Note: This figure shows heterogeneity in treatment effects on the midline outcomes by the number of days elapsed between the last water-delivery day and the midline survey. Estimates come from equation 1 with treatment interacted with indicators for each days-bin; all regressions include religious-leader fixed effects. *Individual Donation* is the amount, out of a 15 JOD endowment provided by the research team, that a woman chose to donate to a water charity. *Collective Donation* is an indicator equal to one if the woman chose a water charity over alternative charities to receive a 700 Jordanian Dinar (JOD) donation on behalf of her class. *Updated Belief* is the change between baseline and midline in the woman's self-assessed efficiency in managing water at home, on a 1–7 scale. Inner (thicker) and outer (thinner) intervals represent 90% and 95% confidence levels, respectively. Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024).

Figure A6. Share of Women Using Water-Saving Methods



Note: This figure shows, by treatment status, the share of women reporting having used each water-saving method in the three months following the intervention (endline sample). Categories are not mutually exclusive, except "no method used."

Figure A7. Raw and Shrunken Estimates of Leader-Specific Treatment Effects



Note: This figure shows density estimates of the raw religious leader-specific treatment-effect estimates and of their Empirical Bayes (shrunken) posterior means.

Table A1. Water Awareness and Religiosity in Jordan and Other MENA countries

	Jordan	Other MENA
Panel A: Water Awareness and Conservation		
Aware of water shortage (2010)	.84	
Aware of water shortage (2018)	.62	
Water is the worst issue	.50	.48
Policy priority	.01	.05
Attribute scarcity to behaviors	.03	
Know water-saving methods	.72	
Adoption water-saving behavior	.06	
Adoption water-saving technology	.25	
Panel B: Religiosity		
Muslim	.98	.95
Pray daily	.88	.83
Quran daily	.73	.58
Religion influences social issues	.50	.40

Note: Author's calculations using Arab Barometer Wave VII (2021/2022) and USAID Water Management Initiative Project data (2010, 2018). Other MENA is the average across all surveyed countries excluding Jordan. Empty cells indicate variables unavailable for the other MENA countries. Outcomes from USAID survey are: *Aware of water shortage*: share thinking there is a water shortage problem in Jordan (2010 and 2018 waves; following outcomes are all taken from 2018 wave); *Know water-saving methods*: share knowing at least one water-saving method; *Adoption water-saving behavior*: average share reporting use of each water-saving practice across all behaviors (e.g., closing faucets, taking shorter showers). *Adoption water-saving technology*: average share reporting use of each water-saving household technology (efficient dishwasher, dual-flush toilets, water-efficient showerheads, faucets). Outcomes from Arab Barometer are: *Water is the worst issue*: share ranking water-related issues as biggest environmental challenge (pollution of drinking water; water scarcity; pollution of waterways). *Policy priority*: share ranking environment (pollution reduction) first for government spending. *Pray daily* and *Quran daily*: share answering "always" or "most of the time". *Religion influences social issues*: share disagreeing that religion should be separated from social life.

Table A2. Descriptive Statistics

	Mean	Std. Dev.	Minimum	Maximum	N
Age	45.79	13.48	16	95	712
Ever married	0.88	0.32	0	1	705
N. children	2.42	1.87	0	7	656
Primary	0.18	0.38	0	1	712
High school	0.49	0.50	0	1	712
University	0.20	0.40	0	1	712
Refugee	0.21	0.41	0	1	635
Urban	0.75	0.43	0	1	662
HH. size	5.08	2.25	0	17	712
PCA wealth	-0.00	1.69	-5	3	712
Employed	0.06	0.24	0	1	669
Number of waterdays	1.34	0.70	0	7	712
Weekly water just enough	0.48	0.50	0	1	689
Water access issues (last month)	0.50	0.50	0	1	613
Water bill	27.89	16.96	0	80	465
N. tanks	1.94	0.96	1	7	554
Trust others	0.18	0.38	0	1	637
Advise monthly with rel. leader	0.19	0.39	0	1	666
Advise >1/year with rel. leader	0.80	0.40	0	1	666
Change mind frequently	0.23	0.42	0	1	657
Change mind sometimes	0.84	0.37	0	1	657
Attend mosque more than weekly	0.53	0.50	0	1	677

Note: The table reports descriptive statistics for the main sample.

Table A3. Topics Covered in Control Class

Topic	Times covered
Prophet migration	11
Obedience to God	1
Love of goodness	1
Night prayer	1
Social temptation	1
Lying	1
Danger of extremism	1
Children education	1
Names of Allah	1
Total	19

Note: This table shows the topics covered in the control classes.

Table A4. Demographics Comparison: Study Sample vs Representative Household Survey

	Study Sample		Arab Barometer			
Variable	N	Mean/SE	N	Mean/SE	Difference	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All women						
Age	712	45.791	736	43.001	2.789	0.000
		(0.505)		(0.516)		
Ever married (=1)	705	0.882	737	0.868	0.014	0.426
		(0.012)		(0.012)		
Household size	712	5.083	737	5.159	-0.076	0.522
		(0.084)		(0.083)		
N. children	656	2.424	590	3.202	-0.778	0.000
		(0.073)		(0.078)		
Urban (=1)	662	0.752	737	0.746	0.006	0.796
		(0.017)		(0.016)		
Primary education (=1)	712	0.177	737	0.199	-0.022	0.274
		(0.014)		(0.015)		
High school education (=1)	712	0.490	737	0.491	-0.001	0.969
		(0.019)		(0.018)		
University education (=1)	712	0.202	737	0.220	-0.018	0.413
		(0.015)		(0.015)		
Employed (=1)	669	0.061	737	0.099	-0.038	0.010
		(0.009)		(0.011)		
Trust others (=1)	637	0.176	350	0.089	0.087	0.000
		(0.015)		(0.015)		
Panel B: Religious women						
Age	712	45.791	412	46.051	-0.260	0.756
		(0.505)		(0.671)		
Ever married (=1)	705	0.882	412	0.881	0.001	0.952
		(0.012)		(0.016)		
Household size	712	5.083	412	5.126	-0.043	0.758
		(0.084)		(0.114)		
N. children	656	2.424	341	3.214	-0.790	0.000
		(0.073)		(0.104)		
Urban (=1)	662	0.752	412	0.714	0.039	0.162
		(0.017)		(0.022)		
Primary education (=1)	712	0.177	412	0.209	-0.032	0.190
		(0.014)		(0.020)		
High school education (=1)	712	0.490	412	0.476	0.014	0.641
		(0.019)		(0.025)		
University education (=1)	712	0.202	412	0.192	0.010	0.671
		(0.015)		(0.019)		
Employed (=1)	669	0.061	412	0.085	-0.024	0.140
		(0.009)		(0.014)		
Trust others (=1)	637	0.176	184	0.054	0.121	0.000
		(0.015)		(0.017)		

Note: This table presents demographic data for study participants and respondents from a nationally representative survey of Jordan conducted in the same year as the intervention. The data for the study sample includes participants who were randomized into a treatment or control group. The survey data are from the Arab Barometer Wave 7 (2022), restricted to Muslim women from the Amman, Irbid, and Mafraq governorates in order to compare with participants in the study. Panel B further restricts to religious women, defined as those who answer *Always* to "Pray Fajr on time". Columns (1)–(2) report N and mean with standard error in parentheses for the study sample of 712 women. Columns (3)–(4) report N and mean with standard error in parentheses for the Arab Barometer sample. Column (5) reports the difference in means between the two samples. Column (6) reports p-values from t-tests of equality of means. Standard errors in parentheses.

Table A5. Heterogeneous Effects on Water Consumption and Expenditure by Baseline Water Consumption

	Heterogeneous Effects *Baseline water consumption*			
	Water Consumption		Water Expenditure	
	(1)	(2)	(3)	(4)
Treatment	-4.8**	2.9	-3.2***	.26
	(2)	(2.9)	(.9)	(1.4)
Treatment×Water consumption		-.23**		-.11*
		(.1)		(.061)
Obs	290	204	290	204
Clusters	19	18	19	18
Mean	27	27	13	13
Waethat FE	Yes	Yes	Yes	Yes

Note: This table shows heterogeneity in estimated treatment effects on endline water consumption and expenditure, by baseline value of water consumption. The estimated equation is as Equation 1 but augmenting the specification with an interaction term between the treatment indicator and baseline self-reported water consumption, as well as disinteracted. All regressions include religious leader fixed effects. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024).*p<0.10,**p<0.05,***p<0.01

Table A6. Treatment Effects on Changes in Own Water Efficiency's Perceptions

	Updated Beliefs			
	Δ Baseline vs. Midline		Δ Midline vs. Endline	Δ Baseline vs. Endline
	(1)	(2)	(3)	(4)
Treatment	-.39***	-.58***	.36*	-.22
	(.11)	(.2)	(.21)	(.23)
Obs	603	258	258	258
Clusters	19	19	19	19
Mean	.17	.17	-.44	-.27
Waethat FE	Yes	Yes	Yes	Yes

Notes: This table shows estimated treatment effects on changes in self-assessed water efficiency from equation 1; all regressions includes religious-leader fixed effects. The outcome is the woman's self-assessed efficiency in managing water at home, on a 1–7 scale; each coefficient is the treatment effect on the change between two survey rounds. I record the change in perceptions between: baseline, i.e. right before the class, and midline, i.e. right after the class (columns (1)-(2); column (2) restrict to the endline sample); midline and endline, i.e. three months after the intervention (column (3)); between baseline and endline (column (4)). For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024).*p<0.10,**p<0.05,***p<0.01

Table A7. Treatment Effects on Alternative Mechanisms: Information, Desirability, Salience and Religiosity

	Alternative Mechanisms						
	Known Practices (1)	Known Devices (2)	Would adopt Practices (3)	Would use Devices (4)	Correct Anwers (5)	Night Prayer (6)	Mistrust Other Rel (7)
Treatment	-.15	-.15	.28	.11	.018	-.035	.015
	(.23)	(.23)	(.42)	(.21)	(.014)	(.046)	(.048)
Obs	653	653	438	558	698	285	294
Clusters	19	19	19	19	19	19	19
Mean	4.6	4.6	4.7	3.6	.61	.32	.27
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows estimated treatment effects on alternative mechanisms, other than beliefs, from equation 1. All regressions include religious-leader fixed effects. In column (1), *Known Practices* is the number of water-saving practices known by the woman at midline. In column (2), *Known Devices* is the number of water-saving devices known by the woman at midline. In column (3), *Would Adopt Practices* is the number of water-saving practices the woman reports being willing to adopt at midline. In column (4), *Would Use Devices* is the number of water-saving devices the respondent reports being willing to use at midline. In column (5), *Correct Answers* is the share of correct answers in a quiz on water-saving methods and the water crisis in Jordan conducted at the end of the class. In column (6), *Night Prayer* equals one if the respondent reports having performed voluntary late-night prayer in the last three months. In column (7), *Mistrust Other Rel.* equals one if the respondent reports distrusting individuals from other religions at endline. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table A8. Heterogeneous Effects by Overlapping Event: Islamic New Year

	Heterogeneity - Islamic Year				
	Collective Donation *dummy* (1)	Individual Donation *JOD* (2)	Water Consumption m^3 (3)	Water Expenditure *JOD* (4)	Days Without Water *days* (5)
Treatment	.098***	1.4*	-5.2*	-3.3**	-.46**
	(.033)	(.79)	(2.7)	(1.2)	(.22)
Treatment × Islamic New Year	.15	2.2	3.1	.86	.62
	(.21)	(1.7)	(4.7)	(2.4)	(.55)
Obs	583	431	290	290	298
Clusters	19	19	19	19	19
Mean	.38	7.8	27	13	.62
Waethat FE	Yes	Yes	Yes	Yes	Yes

Note: This table shows heterogeneous treatment effects by whether the intervention classes coincided with the Islamic New Year. The estimating equation augments equation 1 by including an interaction between the treatment indicator and an indicator equal to one if the class took place during the Islamic New Year celebration, together with the corresponding main effect. All regressions include religious-leader fixed effects. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01.

Table A9. Quantile Treatment Effects

	Quarterly Water Consumption (m^3)			
	Q(20) (1)	Q(40) (2)	Q(60) (3)	Q(80) (4)
Treatment	1.1	.000	.000	-8.17**
	(2.421)	(2.379)	(2.002)	(3.892)
Mean	27	27	27	27
Obs	290	290	290	290
Waethat FE	Yes	Yes	Yes	Yes

Notes: This table shows estimated treatment effects at selected quantiles of the distribution of quarterly household water consumption, absorbing religious-leader fixed effects. *p<0.10,**p<0.05,***p<0.01

Table A10. Mechanisms: Religious Beliefs

	Moderation in Ablution (1)	Paid Water Not Free To Use (2)	Speak-up for Water Waste (3)	Shorten Ablutions (4)	Skip Ghusl (5)	Treated Water Halal (6)	Water Saving Pious (7)
Treatment	.31***	.17*	.16	.12	-.027	-.2*	.42***
	(.12)	(.088)	(.1)	(.12)	(.087)	(.1)	(.14)
Obs	667	628	533	657	644	551	296
Clusters	19	19	19	19	19	19	19
Mean	-.15	-.076	-.067	-.078	.013	.099	-.22
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows estimated treatment effects on water-related religious beliefs from equation 1. All regressions include religious-leader fixed effects. Outcomes are measured as z-scores, so effects are in standard-deviation units. Each outcome represents agreement with a statement, defined as follows: individuals should moderate water use when cleansing before prayers (1); the respondent is not free to be wasteful with water even if she paid for it (2); the respondent would speak up if she saw someone wasting water at the mosque (3); when water is scarce, respondent would perform a shorter ablution (4); when water is scarce, the respondent would skip the long ablution before Friday prayer (5); water treated for reuse is acceptable in most uses, even ablutions (6); the respondent reports that the main reason for saving water during the previous three months was religious piety rather than water efficiency or broader moral considerations (7). For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Table A11. Heterogeneous Effects on Religious Beliefs by Conservativeness

	Moderation in Ablution (1)	Paid Water Not Free To Use (2)	Speak-up for Water Waste (3)	Shorten Ablutions (4)	Skip Ghusl (5)	Treated Water Halal (6)	Water Saving Pious (7)
Treatment	.35*	.16	.36**	-.036	-.16	.0053	.37
	(.2)	(.11)	(.16)	(.13)	(.11)	(.13)	(.29)
Treatment × Conservative	-.14	-.018	-.41	.32**	.24	-.49***	.019
	(.24)	(.15)	(.3)	(.14)	(.17)	(.16)	(.35)
Obs	638	603	511	628	619	527	280
Clusters	19	19	19	19	19	19	19
Mean	-.15	-.076	-.067	-.078	.013	.099	-.22
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports heterogeneous treatment effects on water-related religious beliefs by baseline religious conservativeness. The estimating equation augments equation 1 by including an interaction between the treatment indicator and an indicator equal to one if the respondent reported attending the mosque more than once per week at baseline, together with the corresponding main effect. All regressions include religious-leader fixed effects. Outcomes are measured as z-scores, so effects are in standard-deviation units. Outcome definitions are identical to those in Table A10. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Table A12. Mechanisms: Religious Beliefs (Endline Sample)

	Moderation in Ablution (1)	Paid Water Not Free To Use (2)	Speak-up for Water Waste (3)	Shorten Ablutions (4)	Skip Ghusl (5)	Treated Water Halal (6)	Water Saving Pious (7)
Panel A: Main							
Treatment	.24	.27**	.31**	.11	-.13	.055	.42***
	(.15)	(.13)	(.13)	(.16)	(.14)	(.15)	(.14)
Obs	287	275	228	284	282	244	296
Panel B: Heterogeneity							
Treatment	.23	.34	.59***	-.26	-.26	.32*	.37
	(.32)	(.22)	(.22)	(.23)	(.23)	(.17)	(.29)
Treatment × Conservative	-.12	-.16	-.54*	.66***	.16	-.53***	.019
	(.37)	(.29)	(.31)	(.25)	(.25)	(.18)	(.35)
Obs	274	261	218	270	269	230	280
Clusters	19	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table, Panel A, shows estimated treatment effects on water-related religious beliefs from equation 1, estimated on the endline sample. Panel B reports heterogeneous treatment effects on water-related religious beliefs by baseline religious conservativeness. The estimating equation augments equation 1 by including an interaction between the treatment indicator and an indicator equal to one if the respondent reported attending the mosque more than once per week at baseline, together with the corresponding main effect. All regressions include religious-leader fixed effects. Outcomes are measured as z-scores, so effects are in standard-deviation units. Outcome definitions are identical to those in Table A10. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table A13. Alternative Mechanisms: Information, Desirability, Salience and Religiosity (Endline Sample)

	Alternative Mechanisms						
	Known Practices (1)	Known Devices (2)	Would adopt Practices (3)	Would use Devices (4)	Correct Anwers (5)	Night Prayer (6)	Mistrust Other Rel (7)
Treatment	.12	.12	.78	.33	.016	-.035	.015
	(.26)	(.26)	(.5)	(.22)	(.023)	(.046)	(.048)
Obs	276	276	188	242	299	285	294
Clusters	19	19	19	19	19	19	19
Mean	4.6	4.6	4.7	3.6	.61	.32	.27
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table shows estimated treatment effects on alternative mechanisms from equation 1, estimated on the endline sample. All regressions include religious-leader fixed effects. Outcome definitions are identical to those in Table A7. For each outcome, the control-group mean is reported. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table A14. Content Analysis: Treatment Effects by Religious Message Content

	Individual Donation (1)	Collective Donation (2)	Water Savings (3)	Index All (4)
A Dummy Variables				
Stewardship	.37	.6*	.7	.35
	(.29)	(.29)	(.59)	(.24)
	[.38]	[.13]	[.48]	[.13]
Blessing	.18	.2***	.48**	.25***
	(.13)	(.066)	(.19)	(.044)
	[.25]	[.029]	[.049]	[0.00]
Sin	.79***	.22***	.57***	.53***
	(.13)	(.037)	(.061)	(.051)
	[0.00]	[0.00]	[0.00]	[0.00]
Practice	.27	.049	.083	.25***
	(.29)	(.055)	(.2)	(.068)
	[.5]	[.75]	[.75]	[0.00]
Ownership	.23***	.35***	-.62***	.12***
	(0.00)	(0.00)	(0.00)	(0.00)
	[0.00]	[0.00]	[0.00]	[0.00]
Role Women	-.022***	.052***	-.13***	-.091***
	(0.00)	(0.00)	(0.00)	(0.00)
	[0.00]	[0.00]	[0.00]	[0.00]
B Continous Variables				
Stewardship	.56	.73**	.65	.43
	(.33)	(.3)	(.74)	(.26)
	[.34]	[.21]	[.85]	[.22]
Blessing	.092	.19**	.46**	.22***
	(.14)	(.08)	(.19)	(.05)
	[.51]	[.08]	[.064]	[.0025]
Sin	.96***	.23**	.78***	.63***
	(.32)	(.083)	(.22)	(.11)
	[.21]	[.2]	[.2]	[.18]
Practice	.33	.0057	.088	.27***
	(.33)	(.087)	(.29)	(.091)
	[.68]	[.92]	[.81]	[.15]
Ownership	.045	.45***	-.84***	.08**
	(.16)	(.049)	(.063)	(.035)
	[.9]	[.88]	[.88]	[.42]
Role Women	-.13***	-.21	-.3	-.34**
	(.043)	(.21)	(.2)	(.16)
	[.52]	[.36]	[.41]	[.35]
Obs	431	583	290	650
Clusters	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes

Note: This table shows the regression estimates underlying Figure 9 from equation 3. The dependent variables are the standardized versions of the main outcome measures: *Individual Donation*, *Collective Donation*, *Water Consumption*, and an index combining these outcomes following Anderson (2008). The six religious concepts are *Blessing*, *Sin*, *Stewardship*, *Ownership*, *Practice*, and *Women Role*. Panel (a) shows effects from a regression of the outcomes on six mutually exclusive indicators for the main concept discussed in each class, defined as the concept with the largest share of sentences. Panel (b) shows effects from a regression of the outcomes over six continuous variables measuring the share of sentences belonging to each concept discussed in the class. All regressions include religious-leader fixed effects. Standard errors clustered at the religious-leader level are reported in parentheses. P-values from wild cluster bootstrap-t tests (Cameron et al., 2008), clustered at the religious-leader level, are reported in brackets. *p<0.10, **p<0.05, ***p<0.01.

Table A15. Heterogeneous Treatment Effects by Teaching Style

	Individual Donation (1)	Collective Donation (2)	Water Savings (3)
Treatment	.53***	.27	.25
	(.14)	(.24)	(.18)
Treatment×Positive	-.24	-.044	.019
	(.21)	(.25)	(.23)
Treatment	.54***	.18**	.089
	(.14)	(.077)	(.13)
Treatment×Quran	-.49**	.15	.42*
	(.19)	(.13)	(.23)
Treatment	.075	.24***	.12
	(.094)	(.086)	(.17)
Treatment×Religious Models	.55***	-.013	.29
	(.17)	(.13)	(.22)
Treatment	.27**	.16***	.15
	(.12)	(.055)	(.12)
Treatmen×Participatory	.26	.29*	.46**
	(.31)	(.17)	(.21)
Obs	431	583	290
Clusters	19	19	19
Mean	7.8	.38	27
Waethat FE	Yes	Yes	Yes

Note: This table shows heterogeneous treatment effects by the religious leader's teaching style from equation 4; all regressions include religious-leader fixed effects. The dependent variables are standardized versions of *Individual Donation*, *Collective Donation*, and *Water Consumption*. Each panel reports estimates from a separate specification in which the treatment indicator is interacted with one teaching-style characteristic. The interacted indicator equals one if the religious leader: (*Positive*) has an encouraging tone rather than relying on admonitions and warnings; (*Quran*) refers mainly to religious rather than secular role models; (*Religious Models*) emphasizes religious rather than secular role models; or (*Participatory*) engages the class through a bottom-up, dialogic rather than top-down, frontal approach. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Appendix B Robustness to Attrition and Item Non-Response

Table B1. Attrition Analysis - Lee Bounds

		Lee Bounds					
	Provided Phone number	Water Consumption Lower	Water Consumption Upper	Water Expenditure Lower	Water Expenditure Upper	Days Without Water Lower	Days Without Water Upper
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment	.026	-6.1***	-3.4*	-3.8***	-2.9***	-.56***	-.34*
	(.84)	(.87)	(.046)	(1.9)	(1.9)	(.19)	(.2)
Obs	712	276	277	276	277	283	284
Clusters	19	19	19	19	19	19	19
Mean	.54						
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Column (1) shows the estimated effect of treatment on whether the respondent provided a phone number at baseline. Columns (2)–(7) report Lee (2009) lower and upper bounds for the treatment effects on the three endline outcomes. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table B2. Attrition Analysis - Baseline Characteristics by Phone Provision

	No Phone (1)	Phone (2)	Difference (3)
Age	45.714	45.854	-0.391
	(14.278)	(12.796)	(0.621)
Ever married	0.857	0.904	0.054*
	(0.351)	(0.295)	(0.053)
N. children	2.373	2.464	0.063
	(1.803)	(1.917)	(0.609)
Primary	0.186	0.169	-0.020
	(0.390)	(0.375)	(0.574)
High school	0.472	0.505	0.024
	(0.500)	(0.501)	(0.549)
University	0.202	0.203	0.020
	(0.402)	(0.402)	(0.528)
Refugee	0.213	0.212	-0.018
	(0.410)	(0.410)	(0.544)
Urban	0.700	0.797	0.018
	(0.459)	(0.403)	(0.457)
HH. size	5.143	5.033	-0.126
	(2.283)	(2.225)	(0.471)
PCA wealth	0.186	-0.154	-0.185
	(1.733)	(1.631)	(0.135)
Employed	0.064	0.059	-0.009
	(0.244)	(0.237)	(0.644)
Number of waterdays	1.273	1.403	0.008
	(0.679)	(0.709)	(0.862)
Weekly water just enough	0.474	0.488	0.022
	(0.500)	(0.501)	(0.583)
Water access issue	0.487	0.512	0.031
	(0.501)	(0.501)	(0.523)
Water consumption	28.289	27.613	-0.386
	(17.390)	(16.673)	(0.838)
N. tanks	2.000	1.892	-0.043
	(0.946)	(0.973)	(0.619)
Trust others	0.192	0.163	-0.010
	(0.395)	(0.370)	(0.727)
Advise monthly with rel. leader	0.191	0.185	0.011
	(0.393)	(0.389)	(0.723)
Change mind frequently	0.220	0.241	0.059**
	(0.415)	(0.428)	(0.046)
Attend mosque more than weekly	0.497	0.556	0.077*
	(0.501)	(0.498)	(0.056)
Observations	322	390	712

Note: The table reports baseline characteristics separately for women who did and did not provide a phone number at baseline. Columns (1) and (2) report sample means with standard deviations in parentheses. Column (3) reports the difference in means, estimated from OLS regressions of each characteristic on an indicator for providing a phone number, including religious-leader fixed effects, with p-values in parentheses based on standard errors clustered at the religious-leader level. All characteristics are measured at baseline. *p<0.10,**p<0.05,***p<0.01

Table B3. Item Non-Response by Treatment Status

	Didn't answer Collective Donation		Didn't answer Individual Donation		Didn't answer Water Bill	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-.015	-.015	.059	.056	.0087	.0045
	(.027)	(.024)	(.05)	(.051)	(.013)	(.013)
Age		.0016*		.0017		-.00039
		(.00098)		(.0013)		(.00082)
N. children		-.0078		-.0056		.012***
		(.011)		(.016)		(.0044)
Primary		-.04		.015		-.12*
		(.042)		(.046)		(.062)
High school		.0042		.055		-.07*
		(.035)		(.048)		(.038)
University		-.025		.043		-.044
		(.057)		(.063)		(.058)
Urban		.012		.091		-.022
		(.023)		(.079)		(.071)
HH. size		.0071		.0013		.0074
		(.0087)		(.0095)		(.0069)
PCA. wealth		-.01		-.015*		-.012
		(.012)		(.0082)		(.0079)
N. water days		.017		.0096		.00023
		(.033)		(.035)		(.0082)
Water bill baseline		-.0013		.0026*		-.00077
		(.0009)		(.0014)		(.0011)
Obs	712	712	712	712	300	300
Clusters	19	19	19	19	19	19
Mean	.18	.18	.37	.37	.022	.022
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

Note: This table reports estimated treatment effects on item non-response for the main outcome measures. The dependent variable equals one if the respondent did not provide an answer for the corresponding outcome. All regressions include religious-leader fixed effects. Columns (2), (4), and (6) include additional controls. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01

Table B4. Non-Response Analysis - Baseline Balance in Estimation Samples

	Difference		
	Collective Donation	Individual Donation	Water Consumption
	(1)	(2)	(3)
Age	0.643	0.192	-0.210
	(0.675)	(0.912)	(0.905)
Ever married	0.043	0.056	0.005
	(0.349)	(0.275)	(0.830)
N. children	0.219	0.206	-0.192
	(0.318)	(0.428)	(0.568)
Primary	-0.005	-0.012	-0.045
	(0.862)	(0.785)	(0.281)
High school	0.010	0.003	-0.041
	(0.878)	(0.966)	(0.578)
University	-0.033	0.003	0.045
	(0.411)	(0.946)	(0.432)
Refugee	-0.009	0.008	-0.006
	(0.837)	(0.871)	(0.903)
Urban	-0.012	0.020	-0.000
	(0.756)	(0.400)	(0.987)
HH. size	0.138	0.167	-0.274
	(0.618)	(0.508)	(0.489)
PCA wealth	-0.069	0.067	-0.081
	(0.682)	(0.745)	(0.713)
Employed	-0.007	0.002	0.007
	(0.808)	(0.936)	(0.869)
Number of waterdays	-0.027	-0.028	-0.107
	(0.613)	(0.723)	(0.244)
N. tanks	-0.035	-0.155	-0.127
	(0.801)	(0.391)	(0.503)
Weekly water just enough	-0.013	0.027	-0.020
	(0.762)	(0.468)	(0.788)
Water consumption	2.523	2.063	1.766
	(0.235)	(0.353)	(0.545)
Trust others	-0.041	-0.024	0.032
	(0.308)	(0.643)	(0.540)
Advise monthly with rel. leader	-0.007	-0.000	-0.002
	(0.851)	(0.998)	(0.971)
Change mind frequently	0.028	0.049	0.012
	(0.356)	(0.155)	(0.817)
Attend mosque more than weekly	0.041	0.012	0.065
	(0.507)	(0.855)	(0.406)
Observations	583	431	290

Note: The table reports differences in baseline characteristics between treatment and control groups within the estimation sample for each outcome. Columns (1)–(3) correspond to the samples used to estimate treatment effects on *Collective Donation*, *Individual Donation*, and *Water Consumption*, respectively. Entries report the difference in means estimated from OLS regressions including religious-leader fixed effects, with p-values in parentheses based on standard errors clustered at the religious-leader level. All characteristics are measured at baseline. *p<0.10, **p<0.05, ***p<0.01.

Table B5. Item Non-Response Analysis - Lee Bounds

	Individual Donation		Collective Donation		Water Consumption	
Bounds	Upper	Lower	Upper	Lower	Upper	Lower
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	2.2***	1.3**	.11***	.12***	-3.4**	-5.4***
	(.59)	(.62)	(.03)	(.03)	(1.7)	(1.9)
Obs	413	414	581	582	286	287
Clusters	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports Lee lower and upper bounds for treatment effects accounting for item non-response in each outcome. The bounds are constructed separately for each outcome, allowing for differential response rates between treatment and control groups, following Lee (2009). Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table B6. Item Non-Response by Treatment Status (Mechanisms)

			Didn't answer			
	Moderation in Ablution	Paid Water Not Free To Use	Speak-up for Water Waste	Shorten Ablutions	Skip Ghusl	Treated Water Halal
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	.0074	-.027	-.016	.021	-.016	-.053
	(.024)	(.028)	(.029)	(.021)	(.032)	(.044)
Obs	712	712	712	712	712	712
Clusters	19	19	19	19	19	19
Mean	.059	.13	.26	.065	.11	.25
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	No	No	No	No	No

Note: This table reports estimated treatment effects on item non-response for the main mechanisms measures. The dependent variable equals one if the respondent did not provide an answer for the corresponding outcome. All regressions include religious-leader fixed effects. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01.

Table B7. Non-Response Analysis - Baseline Balance in Estimation Samples (Mechanisms)

	Moderation in Ablution (1)	Paid Water Not Free To Use (2)	Speak-up for Water Waste (3)	Shorten Ablutions (4)	Skip Ghusl (5)	Treated Water Halal (6)
Age	0.532	-0.069	-0.122	0.270	0.216	0.604
	(0.719)	(0.961)	(0.936)	(0.843)	(0.879)	(0.730)
Ever married	0.044	0.044	0.027	0.059	0.054	0.073*
	(0.333)	(0.349)	(0.599)	(0.199)	(0.246)	(0.097)
N. children	0.148	0.239	0.177	0.267	0.193	0.284
	(0.517)	(0.297)	(0.492)	(0.237)	(0.393)	(0.296)
Primary	-0.015	-0.023	-0.035	-0.015	-0.018	-0.006
	(0.636)	(0.448)	(0.253)	(0.596)	(0.535)	(0.832)
High school	0.017	0.010	0.021	0.032	0.049	0.009
	(0.782)	(0.877)	(0.771)	(0.574)	(0.402)	(0.894)
University	-0.027	-0.023	-0.013	-0.036	-0.047	-0.041
	(0.554)	(0.603)	(0.796)	(0.439)	(0.331)	(0.416)
Refugee	-0.020	-0.017	-0.036	-0.014	-0.004	-0.036
	(0.649)	(0.710)	(0.516)	(0.735)	(0.917)	(0.382)
Urban	-0.021	-0.017	-0.021	-0.016	-0.018	-0.023
	(0.625)	(0.725)	(0.627)	(0.722)	(0.686)	(0.632)
HH. size	0.133	0.236	0.234	0.210	0.177	0.251
	(0.564)	(0.314)	(0.401)	(0.330)	(0.409)	(0.369)
PCA wealth	-0.109	-0.026	-0.078	-0.058	-0.092	-0.041
	(0.527)	(0.871)	(0.606)	(0.729)	(0.575)	(0.807)
Employed	0.005	-0.009	0.001	-0.002	-0.009	-0.006
	(0.841)	(0.736)	(0.969)	(0.944)	(0.751)	(0.844)
Numer of waterdays	-0.082	-0.085	-0.048	-0.064	-0.056	-0.094
	(0.159)	(0.164)	(0.434)	(0.281)	(0.335)	(0.159)
Weekly water just enough	-0.008	0.004	-0.012	0.000	0.004	0.004
	(0.829)	(0.911)	(0.774)	(0.991)	(0.919)	(0.941)
Water consumption	2.423	2.412	1.795	2.672	2.691	1.927
	(0.211)	(0.215)	(0.464)	(0.146)	(0.188)	(0.334)
N. tanks	-0.023	-0.030	-0.054	-0.018	-0.024	-0.056
	(0.872)	(0.844)	(0.744)	(0.880)	(0.857)	(0.722)
Trust others	-0.022	-0.017	-0.002	-0.012	-0.012	0.018
	(0.546)	(0.674)	(0.968)	(0.778)	(0.783)	(0.742)
Advise monthly with rel. leader	0.012	-0.000	-0.014	0.007	0.010	0.036
	(0.745)	(0.991)	(0.769)	(0.848)	(0.777)	(0.354)
Attend mosque more than weekly	0.025	-0.000	-0.005	0.033	0.011	0.030
	(0.679)	(0.996)	(0.931)	(0.615)	(0.869)	(0.645)
Change mind frequently	0.032	0.018	0.016	0.024	0.017	-0.013
	(0.290)	(0.562)	(0.607)	(0.406)	(0.567)	(0.688)

Note: The table reports differences in baseline characteristics between treatment and control groups within the estimation sample for each outcome. Columns (1)–(6) correspond to the samples used to estimate treatment effects on main mechanism outcomes. Entries report the difference in means estimated from OLS regressions including religious-leader fixed effects, with p-values in parentheses based on standard errors clustered at the religious-leader level. All characteristics are measured at baseline. *p<0.10, **p<0.05, ***p<0.01.

Table B8. Item Non-Response Analysis - Lee Bounds (Mechanisms)

	Moderation in Ablution		Paid Water Not Free to Use		Speak-up for Water Waste		Shorten Ablutions		Skip Ghusl		Treated Water Halal	
Bounds	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	.32***	.3**	.16*	.22**	.13	.19*	.15	.099	-.083	-.018	-.26**	-.13
	(.12)	(.12)	(.087)	(.085)	(.1)	(.1)	(.11)	(.11)	(.08)	(.085)	(.11)	(.11)
Obs	663	664	619	620	524	525	648	649	635	636	532	533
Clusters	19	19	19	19	19	19	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: The table reports Lee lower and upper bounds for treatment effects accounting for item non-response in each outcome. The bounds are constructed separately for each outcome, allowing for differential response rates between treatment and control groups, following Lee (2009). Standard errors are bootstrap-clustered at the religious-leader level over 2,000 replications, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table B9. Item Non-Response by Treatment Status (Controls)

						Didn't answer						
	Ever Married	N. Children	Refugee	Urban	Employed	Water Just Enough	Water Bill	Trust Others	Advise Leader	Attend Mosque	Change mind Leader	N. tanks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	-0.004	0.008	0.029	0.017	-0.007	0.007	-0.009	0.017	0.002	0.014	0.014	0.027
	(0.009)	(0.020)	(0.037)	(0.019)	(0.016)	(0.017)	(0.048)	(0.020)	(0.019)	(0.023)	(0.025)	(0.036)
Obs	712	712	712	712	712	712	712	712	712	712.000	712	712
Clusters	19	19	19	19	19	19	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table reports estimated treatment effects on item non-response for controls with missing values. The dependent variable equals one if the respondent did not provide an answer for the corresponding control. All regressions include religious-leader fixed effects. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01.

Table B10. Robustness of Endline Results to Differential Phone Provision across Waethats

	Water Bill				Days Without Water	
	Expenditure		Consumption			
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-4.766**	-4.895**	-2.858***	-2.790***	-0.359*	-0.505**
	(2.020)	(2.341)	(0.888)	(1.026)	(0.200)	(0.206)
Obs	290	229	290	229	298	236
Clusters	19	14	19	14	19	14
Mean	27.205	28.475	12.409	12.931	0.622	0.728
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Baseline	Drop unbalanced	Baseline	Drop unbalanced	Baseline	Drop unbalanced

Note: This table replicates the main endline results dropping waethats where the gap in phone number provision between treated and control women exceeded 20 percentage points in either direction. Columns (1),(3),(5) replicate the baseline estimates on the full endline sample of 300 women. Columns (2),(4),(6) restrict to the 14 waethats with balanced phone provision. All regressions include religious-leader fixed effects. Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10,**p<0.05,***p<0.01.

Appendix C Robustness to Inference

Table C1. Baseline Balance on Women Characteristics - No Strata Fixed-Effects

	Baseline Sample			Endline Sample		
	Control	Treatment	Difference	Control	Treatment	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Age	45.861	45.727	0.135	46.970	46.018	0.952
	(0.768)	(0.666)	(0.894)	(1.139)	(0.950)	(0.518)
Ever married	0.866	0.897	-0.032	0.902	0.920	-0.017
	(0.019)	(0.016)	(0.194)	(0.026)	(0.021)	(0.599)
N. children	2.349	2.491	-0.142	2.488	2.474	0.014
	(0.112)	(0.095)	(0.331)	(0.188)	(0.149)	(0.954)
Primary	0.177	0.177	0.000	0.193	0.170	0.023
	(0.021)	(0.020)	(0.999)	(0.034)	(0.029)	(0.609)
High school	0.493	0.488	0.005	0.541	0.485	0.056
	(0.027)	(0.026)	(0.901)	(0.043)	(0.039)	(0.337)
University	0.215	0.190	0.025	0.178	0.200	-0.022
	(0.022)	(0.020)	(0.408)	(0.033)	(0.031)	(0.627)
Refugee	0.214	0.216	-0.002	0.218	0.228	-0.010
	(0.024)	(0.023)	(0.947)	(0.039)	(0.034)	(0.841)
Urban	0.748	0.756	-0.007	0.789	0.837	-0.048
	(0.024)	(0.023)	(0.826)	(0.037)	(0.030)	(0.309)
HH. size	4.950	5.204	-0.254	5.148	4.945	0.203
	(0.119)	(0.119)	(0.133)	(0.192)	(0.184)	(0.449)
PCA wealth	0.076	-0.069	0.145	-0.205	-0.353	0.148
	(0.091)	(0.087)	(0.251)	(0.145)	(0.124)	(0.435)
Employed	0.060	0.063	-0.003	0.063	0.057	0.006
	(0.013)	(0.013)	(0.890)	(0.022)	(0.018)	(0.832)
Number of waterdays	1.375	1.316	0.058	1.504	1.382	0.122
	(0.042)	(0.032)	(0.266)	(0.078)	(0.043)	(0.154)
Weekly water just enough	0.480	0.483	-0.003	0.523	0.487	0.035
	(0.028)	(0.026)	(0.935)	(0.044)	(0.040)	(0.550)
Water bill	26.594	29.032	-2.438	26.956	29.392	-2.436
	(1.086)	(1.125)	(0.122)	(1.756)	(1.559)	(0.302)
N. of tanks	1.974	1.906	0.068	1.927	1.752	0.175
	(0.061)	(0.055)	(0.407)	(0.104)	(0.072)	(0.156)
Trust others	0.184	0.169	0.015	0.163	0.163	-0.001
	(0.022)	(0.021)	(0.622)	(0.033)	(0.030)	(0.986)
Advise monthly with rel. leader	0.177	0.197	-0.020	0.168	0.159	0.009
	(0.022)	(0.021)	(0.511)	(0.034)	(0.029)	(0.844)
Change mind frequently	0.204	0.257	-0.053	0.218	0.232	-0.014
	(0.023)	(0.024)	(0.110)	(0.037)	(0.034)	(0.782)
Attend mosque more than weekly	0.512	0.544	-0.032	0.577	0.565	0.012
	(0.028)	(0.027)	(0.412)	(0.043)	(0.040)	(0.840)
Observations	339	373	712	135	165	300

Note: The table reports sample means with standard deviations in parentheses. Columns (1)–(3) refer to the baseline sample; columns (4)–(6) refer to the endline sample, randomly selected among women who provided a phone number at baseline. Columns (3) and (6) report the difference in means, estimated from OLS regressions of each characteristic on treatment, with p-values in parentheses based on standard errors clustered at the religious-leader level. All characteristics are measured at baseline. *p<0.10,**p<0.05,***p<0.01.

Table C2. Robustness of Main Outcomes to Alternative Inference Procedures

	Robustness - Main Outcomes				
	Individual Donation	Collective Donation	Water Bill Consumption	Water Bill Expenditure	Days Without Water
	(1)	(2)	(3)	(4)	(5)
A Cluster: Class					
Treatment	1.7***	.12***	-4.8***	-3.2***	-.36**
	(.45)	(.022)	(1.5)	(.68)	(.16)
B Cluster: Waethat					
Treatment	1.7**	.12***	-4.8**	-3.2***	-.36*
	(.62)	(.03)	(2)	(.91)	(.2)
C Randomization Inference					
Treatment	1.7***	.12***	-4.8***	-3.2***	-.36***
	(.45)	(.039)	(1.8)	(.95)	(.14)
Obs	431	583	290	290	298
Mean	7.8	.38	27	13	.62
Waethat FE	Yes	Yes	Yes	Yes	Yes

Note: This table shows estimated treatment effects for the main outcomes in equation 1. Panel (a) reports standard errors clustered at the class level; panel (b) reports standard errors clustered at the pair, religious-leader, level (without bootstrapping); panel (c) reports standard errors calculated using randomization inference following Athey and Imbens (2017). *p<0.10, **p<0.05, ***p<0.01.

Table C3. Robustness of Main Mechanisms to Alternative Inference Procedures

	Robustness - Mechanisms						
	Moderation in Ablution	Speak-up for Water Waste	Paid Water Not Free to Use	Shorten Ablutions	Skip Ghusl	Treated Water Halal	Water Saving Pious
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A Cluster: Class							
Treatment	.31***	.17**	.16**	.12	-.027	-.2**	.42***
	(.085)	(.063)	(.074)	(.083)	(.063)	(.079)	(.11)
B Cluster: Waethat							
Treatment	.31**	.17*	.16	.12	-.027	-.2*	.42**
	(.12)	(.087)	(.1)	(.11)	(.087)	(.11)	(.14)
C Randomization Inference							
Treatment	.31***	.17**	.16*	.12	-.027	-.2**	.42***
	(.077)	(.081)	(.087)	(.076)	(.079)	(.084)	(.12)
Obs	667	628	533	657	644	551	296
Clusters	38	38	38	38	38	38	37
Mean	.31	.27	.49	.32	.19	.67	.47
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table shows estimated treatment effects for the main mechanisms in equation 1. Panel (a) reports standard errors clustered at the class level; panel (b) reports standard errors clustered at the pair, religious-leader, level (without bootstrapping); panel (c) reports standard errors calculated using randomization inference following Athey and Imbens (2017). *p<0.10, **p<0.05, ***p<0.01.

Table C4. Multiple Hypothesis Testing: Primary Outcomes

Outcome	Coef.	SE	Unadj. p	WY p	Bonferroni p
Collective Donation	0.116	0.030	0.001	0.009	0.003
Individual Donation	1.744	0.616	0.011	0.045	0.022
Water Consumption	−4.766	2.028	0.030	0.045	0.030

Notes: The table reports family-wise error rate (FWER) corrected p-values for the three primary outcomes. The Westfall-Young (WY) step-down procedure of Westfall and Young (1993) is implemented with 2,000 bootstrap replications, resampling pairs at the waethat level. "Coef." and "SE" report the original treatment effect and bootstrapped clustered standard error from the main specification, including waethat fixed effects. "Unadj. p" is the unadjusted p-value; "WY p" is the Westfall-Young FWER-adjusted p-value; "Bonferroni p" is the more conservative Bonferroni correction. All three primary outcomes remain statistically significant at the 5% level after FWER adjustment.

Table C5. Robustness of Main Outcomes to Baseline Controls

Main Outcomes - All Controls

	Collective Donation		Individual Donation		Water Consumption	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	.12***	.11***	1.7***	1.7***	-4.8**	-4.5**
	(.03)	(.034)	(.59)	(.6)	(2)	(1.9)
Obs	583	583	431	431	290	290
Clusters	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	All	No	All	No	All

Note: The table shows estimated treatment effects for the main outcomes in equation 1. Columns (1), (3) and (5) report specifications without controls. Columns (2), (4) and (6) include the full set of baseline controls: age, marital status, number of children, indicators for highest educational attainment (primary, high school, university or above), refugee status, urban residence, household size, a durables wealth index (PCA), employment status, number of water days, number of water tanks, water stress, baseline water consumption, trust in others, and measures of religiosity (mosque attendance and frequency of interactions with religious leaders). Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Table C6. Robustness of Main Mechanisms to Baseline Controls

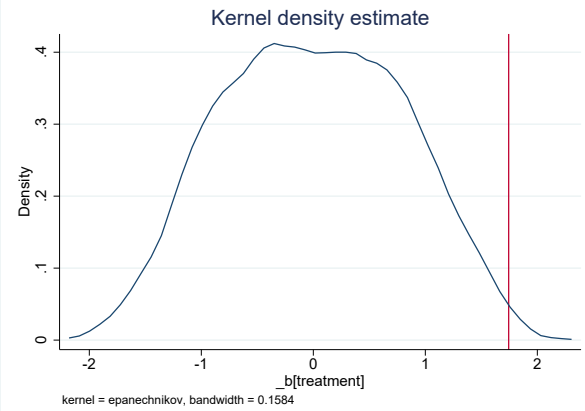
Mechanisms - All Controls

	Moderation in Ablution		Speak-up for Water Waste		Paid Water Not Free to Use		Shorten Ablutions		Skip Ghusl		Treated Water Halal	Treated Water Pious	Water Saving	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Treatment	.31***	.29***	.17*	.16**	.16	.15	.12	.12	-.027	-.027	-.2*	-.2*	.41***	.42***
	(.12)	(.11)	(.088)	(.082)	(.1)	(.1)	(.12)	(.11)	(.087)	(.084)	(.1)	(.11)	(.14)	(.14)
	667	667	628	628	533	533	657	657	644	644	551	551	296	296
Clusters	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Waethat FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	All	No	All	No	All	No	All	No	All	No	All	No	All

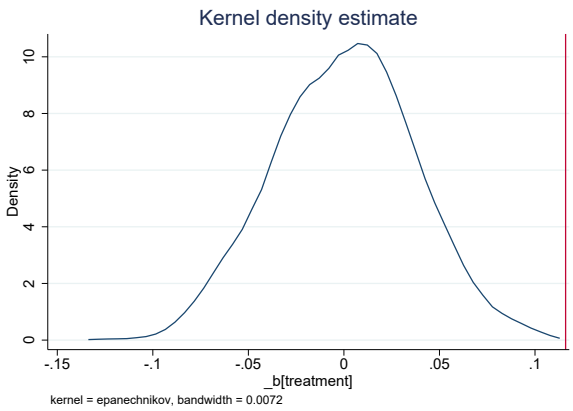
Notes: The table shows estimated treatment effects for main mechanisms in equation 1. Columns (1), (3) and (5) report specifications without controls. Columns (2), (4) and (6) include the full set of baseline controls: age, marital status, number of children, indicators for highest educational attainment (primary, high school, university or above), refugee status, urban residence, household size, a durables wealth index (PCA), employment status, number of water days, number of water tanks, water stress, baseline water bill expenditure, trust in others, and measures of religiosity (mosque attendance and frequency of interactions with religious leaders). Standard errors bootstrap-clustered at the religious-leader level over 2,000 replications are reported in parentheses, following De Chaisemartin and Ramirez-Cuellar (2024). *p<0.10, **p<0.05, ***p<0.01.

Figure C1. Density - Randomization Inference

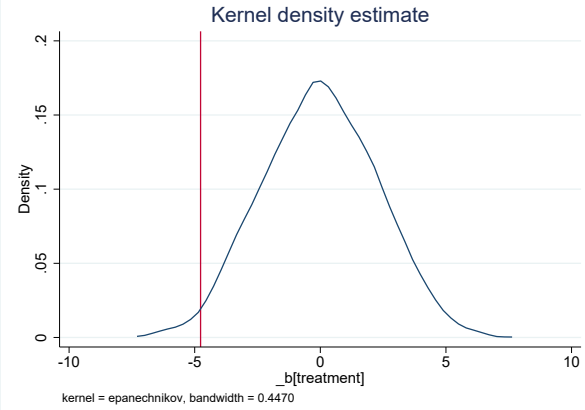
(a) Individual Donation



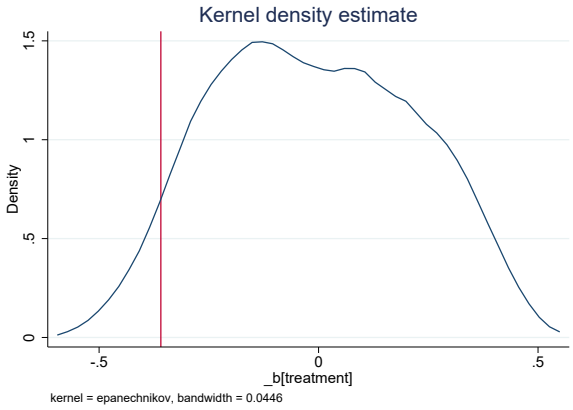
(b) Collective Donation



(c) Water Consumption



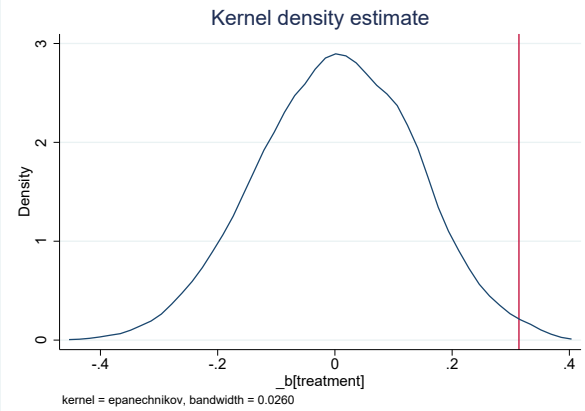
(d) Days Without Water



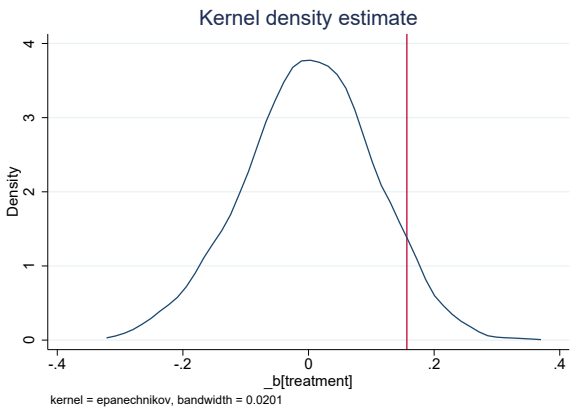
Note: The figure shows a simulation exercise following Athey and Imbens (2017). Each simulated treatment effect comes from randomly assigning classes, within pairs, to the religious treatment using the same randomization algorithm used for the true assignment and then running a regression of the outcome on the treatment status, including religious leader fixed effects. The red line is the estimated effect. The reported p-value is calculated as the number of simulated effects greater in absolute value than the estimated effect.

Figure C2. Density - Randomization Inference

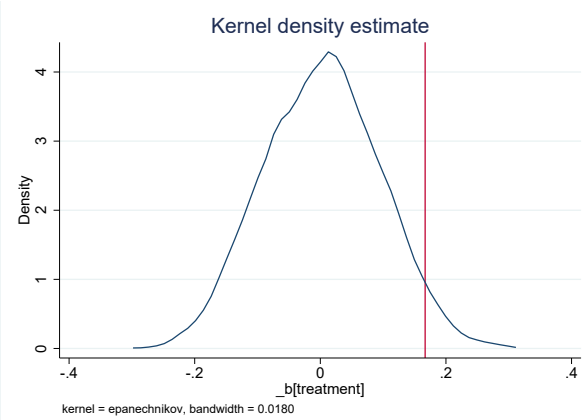
(a) Moderation in Ablution



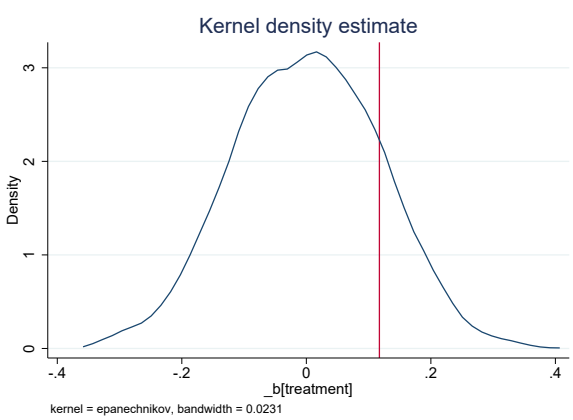
(b) Speak-up for Water Waste



(c) Paid Water not Free



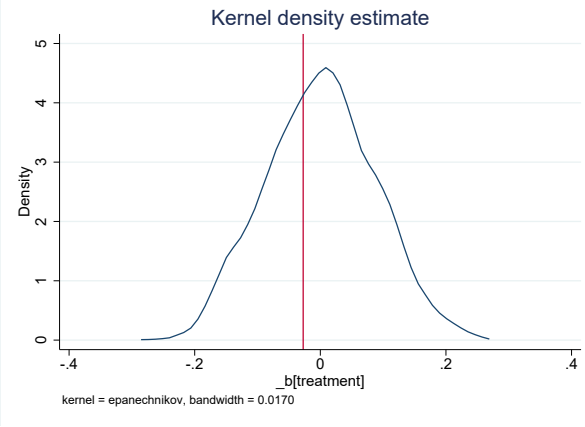
(d) Shorten Ablutions



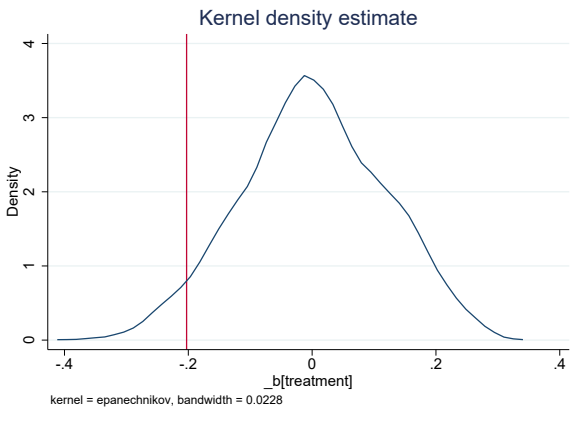
Note: The figure shows a simulation exercise following Athey and Imbens (2017). Each simulated treatment effect comes from randomly assigning classes, within pairs, to the religious treatment using the same randomization algorithm used for the true assignment and then running a regression of the outcome on the treatment status, including religious leader fixed effects. The red line is the estimated effect. The reported p-value is calculated as the number of simulated effects greater in absolute value than the estimated effect.

Figure C3. Density - Randomization Inference

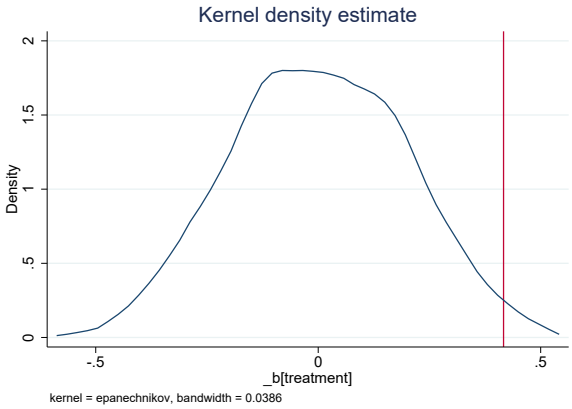
(a) Skip Ghusl



(b) Treated Water Halal



(c) Water Saving Pious



Note: The figure shows a simulation exercise following Athey and Imbens (2017). Each simulated treatment effect comes from randomly assigning classes, within pairs, to the religious treatment using the same randomization algorithm used for the true assignment and then running a regression of the outcome on the treatment status, including religious leader fixed effects. The red line is the estimated effect. The reported p-value is calculated as the number of simulated effects greater in absolute value than the estimated effect.

Appendix D Text Analysis

To classify the recordings of the religious classes, I rely on a narrative approach to content analysis (Grimmer and Stewart, 2013; Neuendorf, 2017). This technique is particularly effective for texts with specialized content that is difficult to automate, as in my case of Islamic precepts on water (Grimmer and Stewart (2013)). I select three human coders from Jordan, who have no previous experience with the experiment but have similar socio-economic and religious backgrounds to the women in my sample. Coders classify scripts transcribed from classes' recordings. After removing interjections and greetings, the unit of analysis is a class sentence. I develop a codebook to train the coders to identify the categories of interest, and classify sentences accordingly. Coders classify each sentence according to its religious content, and classify each class according to the teaching style adopted by the religious leader (*waethat*). Following Neuendorf (2017), coders are first trained on a script sample, during which they perform the exercise jointly and provide feedback to incorporate any missing categories; this training and debriefing round is repeated twice. After the training, coders classify the remaining data independently, without contact with each other or with resources outside the codebook. To validate the procedure, I calculate an average inter-coder agreement of 0.96, using Cohen's kappa metrics (Landis and Koch (1977)), in line with comparable studies using human coding. In cases where no majority agreement was reached, I attributed the final classification of the sentence using GPT-4. As a further validation check, I re-classify the content of the recordings using GPT-4, applying the same codebook instructions given to the human coders. Because the content is highly specialized and context-dependent, GPT-4 fails to classify 18% of sentences; among the sentences it does classify, agreement with the human coding is 91%.

The codebook instructs coders to classify each sentence into one of six major concepts of water in Islam, drawn from the curriculum used to train the *waethats* as part of the intervention. Each concept is broken down into smaller micro-topics that guide the coders' classification, as follows:

- *Blessing*: water as a gift to humankind; water as origin of life; sign of God omnipotence; concept of free gift that God can take away at any moment.
- *Stewardship*: humans as stewards of God's perfect creation; responsibility of humans to preserve God's creation for future generations.

- *Sin*: concepts of sin and/or punishments following bad use of water (e.g. wasting, polluting, etc.) and rewards for good use of water; mentions of forbidden water behaviors.

- *Ownership*: Islamic law (Sharia) to use and share water sources among communities; Islamic law (Sharia) on rights and responsibilities regarding water ownership among communities; Islamic law (Sharia) to address disputes related to water rights and usage.

- *Practice*: any mention to religious ablutions, both wudu and ghusl, which may include type of water to use, method (e.g. short, sunna, dry, etc.), religious prescriptions, etc.; religious suitability of adoption of new water technologies, which may include discussions of treated waste water, and water saving devices; water as best form of charity, both in zakat and saddaqa jariya.

- *Women Role*: role of women as main ambassadors to spread water conservation principles in society; women as main care-giver responsible of water in the household; women main responsible to educate future generations to environmental preservation; women as main role models in the household.

Classes are also classified according to the teaching style adopted by the religious leader:

- *Positive*: waethat is positive and cheerful in engaging with women and promoting water conservation. Opposite case if waethat use admonitions to preach and motivate.

- *Quran*: the waethat uses Quran as main source to prepare the class.

- *Religious Models*: waethat uses as main role models the Prophet and other pious Muslims (e.g. wives of Prophet, sheiks, etc.)

- *Participatory*: waethats engages women through open dialogue, tries different bottom-up approaches (e.g. games, examples, demonstrations), with frequent questions and answers.

Examples of Sentences Classification
Blessing Concepts

- The most beautiful grace Allah gives to a human being is water, because water is the main reason for living.

- Allah told us in the Quran that water is the most important resource on the earth, Allah said in Quran Kareem "And We made from water every living thing. Will they not believe?".

- Water is more valuable than possessions and jewels. Harun al-Rashid, the Abbasid caliph, once approached Ibn Samak and requested water. When he began drinking the water hastily, Ibn Sammak remarked, "Amir al-Mu'min, if this water were hidden from you, how much would you be willing to pay for it?" Harun al-Rashid replied, "I would give half of all I possess for it." Ibn Sammak then asked, "And if, by God's grace, the water remains in our bodies, how much would you pay to remove it from your body?" Harun al-Rashid answered, "I would give everything I have." Ibn Sammak concluded, "Possessions are of no worth if they can't equal a glass of water," which moved Harun al-Rashid to tears.

- Allah said "one is fresh, sweet, and pleasant to taste, while the other is salty and bitter". This did not happen by chance, but there is a very accurate reason. If all water was salty, life would be impossible on the earth. But Allah, in wisdom, made water sweet: "and have given you to drink sweet water". Although most of the earth is covered by salty oceans and rivers, the rainwater is sweet and here we can find the gift and balance from Allah.

Stewardship Concepts

- Saving water is a public responsibility at home, hospitals, public gardens, and government organizations, because you are stewards on this earth and for your community.

- Each of you is a shepherd and each of you is responsible for his flock. 'Abdallah b. 'Umar reported God's Messenger as saying, "Each of you is a shepherd and each of you is responsible for his flock. The imam who is over the people is a shepherd and is responsible for his flock; a man is a shepherd in charge of the inhabitants of his household and he is responsible for his flock; a woman is a shepherdess in charge of her husband's house and children and she is responsible for them. So each of you is a shepherd and each of you is responsible for his flock." Foremost, you are responsible for your brothers' survival on this planet taking care of its resources.

- God gave you the world, beautiful, perfect and verdant and you are its stewards.

- Allah orders us to protect the grace he gives to us, and be viceregents of his perfect creation. Islam came to guide us to protect these graces, and Islam requires us to protect water and make individuals, families, and community life easier.

- Older Islamic communities and our ancestors, parents, and grandparents, lived with less water and a hard life, but their rule was to spare and protect water for all the community.

Sin Concepts

- The person who wastes water, Allah will punish her. A lot of Islamic texts banned wasting water even in activities related to prayers.

- Islam is a religion of moderation. It is against excess and negligence. Islam has fought extravagance in everything. Among the manifestations of fighting this waste and extravagance, there is the Prophet's supplication of not misusing water. The prohibition of extravagance in water use applies even if a person is next to a flowing river in which there is a lot of water.

- Allah prohibited extravagance even in food and drinking. Allah Almighty said: "Eat and drink but do not be extravagant as he does not love the extravagant". And said: "Do not be spendthrifts. Verily spendthrifts are brothers of evil ones, and he the evil one is to his Lord ungrateful".

- The Prophet prohibits extravagance in the use of water even in one of the most revered acts of worship, ablutions, which is essential for prayer.

Ownership Concepts

- Who owns the water in Islam? The water is owned by everyone and is managed by the state. No one can monopolize the water for him/herself. Prophet Mohammad said, "Muslim are partners in three things: grazing, pasture, water, and fire."

- Remember the story of the Ruma well. The Prophet had come to Medina, and there was only one well of sweet water, the Well of Rumah. To give access to water to all the community, the Prophet asked the owner to sell him the well in exchange for a garden in Paradise. So no one can monopolize water for him/herself, and the state's responsibility is to distribute the water to citizens equally.

Practice Concepts

- The Prophet teaches us that moderation has to be used in ablutions. The Prophet once saw Saad doing ablution with abundant water. He said: "What is this extravagance?" and Saad said: "O Messenger of Allah, is there extravagance in ablution?" He said: "Yes, even if you are on a flowing river." Here it becomes clear that the Prophet did not base his prohibition of extravagance in water usage only on water scarcity or security. He forbids extravagance even when water is abundant as revealed in "even if you are on a flowing river."

- A Bedouin came to the Prophet and asked him about his ablution. He showed him how to perform it washing each part of the body three times. Then he said: "This is ablution, and whoever does more than this, has done evil, transgressed the limits and wronged himself". The Prophet considers excess of the third wash in ablution not good, even though this excess is related to a pious act of worship.

- The Prophet used to perform ablution and wash with a small amount of water, ablutions with a Mudd and wash with a Sa' to five Mudds.

- It was narrated by Sa'd bin 'Ubadah that his mother died. He said: "O Messenger of Allah, my mother has died; can I give charity on her behalf?" He said: "Yes." He said: "What kind of charity is best?" He said: "Providing drinking water." And that is the drinking fountain of Sa'd in Al-Madinah.

- We are required to adopt optimal behaviors in the use of water and use technologies that contribute to the rationalization of water consumption, such as treated water. The Awqaf and Al-Ahzar gave it the green light. Now treated water has been recognized halal since modern technologies allow us to obtain treated water that is as pure as water from a spring. The reason that such water was haram was to protect us from diseases. Since the treated water by modern technology is perfectly pure, we are now allowed to use it even for the most important ritual ablutions.

Women Role Concepts

- Woman is the main core to establishing strong bonded societies, that's why woman is honored in Islam. Islam gave her rights and duties and gave her the most important task which is raising generations. In the current difficult water situation that the citizens suffer, the main role of the woman is to deliver the message of using water wisely to her family and society.

- A woman is capable of changing many wrong behaviors inside and outside the house, that's why Allah ordered us to obey mothers, and made obeying parents linked with obeying Allah. Women have the responsibility of using water wisely and share this awareness among their family members.
- Women's role is to bring attention to saving water, first within the family, then in the community through their children and future generations.

Appendix E Information Session

The information session lasted around 20 minutes. The session content was drawn from the nonreligious sections of the *The Guide in Water from an Islamic Perspective*, developed by GIZ, which cover water scarcity in Jordan and practical tips to save water.

In the first part of the session, the waethat discussed the water crisis in Jordan. A few examples of the content covered:

- Jordan is one of the driest countries in the world: water resources per person amount to less than 60 cubic meters per year, far below the international water poverty line.
- Pressure on available water resources is increasing due to population growth and climate change, which has altered rainfall patterns and average temperatures.
- Groundwater resources have been overused for decades, leaving supplies perilously uncertain.
- Despite this scarcity, awareness of water conservation remains low: an estimated 50% of the total water supply is used for domestic purposes, such as bathrooms and garden irrigation.
- Treated water is considered one of the most essential alternatives that may lead to the reduction of water deficit. There are 30 water treatment plants in Jordan with a capacity of around 151 million cubic meters.
- A substantial share of supplied water is lost through leaks and damage to the pipeline network, making prompt reporting of leaks important.

The session then presented practical water-saving methods and instructed about available water-saving devices. At the end of the class, participants received a leaflet summarizing the main water-saving tips, along with motivational logos (also displayed as stickers in the room), a toll-free number to call to install subsidized water-saving devices, and a number to report leaks observed in the street or in their building. Examples of water-saving method reminders from the leaflet:

- Close the tap while shaving or brushing teeth to save 90% relative to leaving it open.
- Water reused from bathing and from the washbasin can provide around 30% of household consumption.

- Close the shower while using soap or a loofah.
- Always use a bucket to wash the car instead of the hose.
- Manage your water tank: clean the tank every six months.
- Dry-clean carpets and curtains.
- If you see a leak in public streets, report the issue to the authorities quickly at this number: XXX.
- Use vacuum cleaners to clean sidewalks and stairs instead of removing dirt with a water hose.
- Water the garden in the morning or evening, and prefer water-efficient irrigation methods.
- In the lowlands, closing water taps while tanks are filling helps water reach higher areas.
- Run the washing machine only with a complete load.

Examples of water-saving device reminders from the leaflet:

- Install water-saving equipment on the bathroom washbasin to save 40% of the water used for shaving, tooth brushing, and ablution.
- Install water-saving devices in the shower: rationalized showers halve the monthly consumption of water for showering.
- Install rationalizers on the kitchen washbasin to save 40% of total water consumption.
- Install a water-saving flush to halve the monthly consumption of water for toilet flushing.
- Install a water-saving washing machine or dishwasher to save 50% of the water used.

Examples of motivational logos displayed in the room and included in the leaflet:

Figure E1. Motivational logos from the information session leaflet