

RAINFLOWER RESEARCH PAPER PROPOSAL

The Water Economy of Bangladesh: What People Pay for Water in Our Cities, Towns and Villages

The Price of a Litre: How Water Is Bought, Sold and Valued in Bangladesh

> What is the real price per litre of water from each source used by households in the study area, and how accurately do households know what they pay?

2–5 students TEAM	**~80** HOURS EACH	**13** WEEKS
2,500 raindrops ($5) REWARD PER STUDENT	**BDT 7,000** EXPENSE BUDGET	**5,000–15,000 words** PAPER LENGTH

Measures the real price per litre of water from each source used by households in one study area in Bangladesh, compares it with what households believe they spend, and explains the local water market through interviews with sellers and families. Produces a community awareness sheet.

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01 Summary

This project asks a simple question that almost nobody can answer from memory: *what does one litre of water actually cost a household in Bangladesh, and does the household know?* Your team will measure the real price of water in one or two communities. You will record the price of piped water, tube-well water, jar water, bottled water and water from sellers, and then survey households about how much they spend, which sources they use and what they believe about the price. Short video interviews with water sellers, shop owners and households will explain the reasons behind the numbers.

The result is a paper that shows the "water economy" of a real place: where water comes from, who sells it, what it costs per litre at each step, and how aware people are of what they pay. The study works in any month of the year because prices, sources and habits exist all year round. The paper will also produce a one-page "Know Your Water Price" sheet that you can share in your community as an awareness outcome.

02 Why this matters

In Bangladesh, water is often called free, but almost every household pays for it in some way. City households pay a monthly water bill, buy 20-litre jars, or pay a neighbour with a deep tube well. Town households may pay a pourashava (municipal) fee, buy bottled water for guests, or spend money on a

filter. Village households may pay to install or repair a tube well, buy jars when the well water is salty or has arsenic, or walk far to a safe source, which costs time instead of money.

These costs are rarely compared. A family may pay BDT 50 for a 20-litre jar from a shop and at the same time pay a water bill for piped water they do not drink. The poorest families often pay the highest price per litre, because they buy small amounts from sellers. When people do not know what they pay per litre, they cannot make good choices or ask for better service. Your study will make this invisible economy visible for one community, with real numbers.

03 Background

Public water supply in large cities is run by water authorities such as Dhaka WASA and Chittagong WASA, which charge a metered tariff per 1,000 litres for residential and commercial connections [verify: current residential tariff per 1,000 litres, official WASA website]. Many homes also draw groundwater through private pumps. In smaller towns like Noakhali, the pourashava may run a piped system for part of the town, and most households use tube wells [verify: local pourashava water service area]. In Sylhet, the city corporation supplies some areas, and many households depend on tube wells and private supply [verify].

Alongside public supply there is a large private market: 20-litre refill jars delivered by van or rickshaw, bottled water in 500 ml to 5-litre sizes, "water ATMs" or vending points in some city areas, and informal sellers who carry water in drums [verify: typical jar and bottle prices in your area at the time of study]. Household filters, boiling fuel and tube-well repair are also part of the cost of water, even though they are not a price per litre.

Studies by development organisations and newspapers have reported that poor urban households in Bangladesh may pay many times the official tariff per litre when they buy from informal sellers [verify: find one report or news article from a reliable source and cite it properly]. Research on willingness to pay for safe water in rural Bangladesh has also been published in academic journals [verify: search Google Scholar for "willingness to pay" "drinking water" Bangladesh and cite one peer-reviewed study]. Your paper does not need many sources. Two or three verified sources, cited correctly, are enough for a strong background section.

04 Research question and hypothesis

Primary research question: What is the real price per litre of water from each source used by households in [your study area], and how accurately do households know what they pay?

Secondary questions:

1. How does the price per litre differ between piped water, tube-well water, jar water, bottled water and water bought from sellers?
2. Which sources do households use for drinking versus cooking and washing, and why?

Hypothesis: Households in the study area pay a higher price per litre for water they drink (jars, bottles, sellers) than for water they use for other purposes (piped, tube well), and most households cannot state their monthly water spending within 25% of what the price data shows.

Your data may prove this hypothesis wrong. That is fine. A paper that reports "we expected X but found Y" is still a strong paper if the data is good.

05 Who should do this

Team size: 2 to 5 students. This project has three parts (price observation, household survey, interviews) that work best when split across team members, so it needs a team of at least two.

Suited regions: All four. The project is strongest when a team studies one clear area, such as one ward of Dhaka or Chittagong, one neighbourhood of Sylhet, or one union or town ward in Noakhali. Teams in different regions can later compare results.

Suggested roles:

- **Price recorder:** visits shops, jar sellers and water points, records prices and takes photos.
- **Survey lead:** builds and runs the AKTI Survey, recruits respondents, exports data.
- **Interview lead:** arranges and records 6 to 8 video interviews, keeps consent records.
- **Writer and analyst (can be shared):** builds the price-per-litre table, charts and the paper draft.

06 Evidence plan

Every claim in your paper must rest on evidence you collected. This project uses the three required evidence types plus one small addition, price observation.

Evidence	What it will show	Target amount
AKTI Survey of households	Which sources people use, how much they spend, what they believe they pay	50 or more completed responses from different households
Video interviews	Why prices are what they are; how sellers and families decide	6 to 8 interviews of 5 to 10 minutes
Geo-tagged photos	Proof of sources, sellers, price boards, bills and your presence in the field	20 or more photos with location on
Price observation sheet	The actual price of each water product at each place	15 or more price records across at least 5 points of sale

Why each fits the question: the survey measures what households believe and spend; price observation measures what water really costs; interviews explain the gap between the two; photos show readers the real places and prove the work was done in the field.

07 Survey design

Build this survey on AKTI Survey in Bangla, with an English copy for your paper. Keep it under 8 minutes. Pilot it with 3 to 5 people before the real run and fix anything that confuses them.

Target respondent: one adult (18 or older) per household who knows the household's spending. Do not survey children. Ask the respondent, not a neighbour, about their own household.

Recruitment: every second household on 3 to 5 streets or lanes in your study area, visited in daylight. Record the street name and the number of refusals. Do not survey only your friends and relatives; if you must include some, mark them in the data.

Sample size target: 50 completed responses.

Draft questions (ready to paste):

1. Which area do you live in? (short answer: ward, mahalla or village name)
2. How many people live in your household? (number)
3. What type of home is it? (single choice: own house / rented flat / rented room / other)
4. Which of these water sources does your household use? (multiple choice: piped supply with meter / piped supply without meter / own tube well or pump / shared or public tube well / 20-litre jar delivery / bottled water from shop / water seller with drum or van / pond, river or other surface water / other)
5. Which ONE source do you mainly use for **drinking**? (single choice, same list)
6. Which ONE source do you mainly use for **cooking**? (single choice, same list)
7. Which ONE source do you mainly use for **washing and bathing**? (single choice, same list)
8. Do you treat your drinking water at home? (single choice: boil / filter / chlorine tablets or alum / nothing / other)
9. If you have a water bill or fee, how much do you pay per month? (number in BDT, or "no bill")
10. How many 20-litre jars does your household buy per week? (number, 0 if none)
11. What do you pay for one 20-litre jar? (number in BDT)
12. How many bottles of water (any size) does your household buy per week? (number)
13. What did you pay the last time you bought water from a seller or neighbour? (number in BDT, and amount of water)
14. About how much does your household spend on water in total per month, including bills, jars, bottles, fuel for boiling and filter costs? (number in BDT)
15. How confident are you in that number? (single choice: very confident / somewhat / just a guess)
16. Do you think the price you pay for drinking water is fair? (single choice: too high / about right / cheap / don't know)
17. Do you know the official price per 1,000 litres of piped water in your area? (single choice: yes, I know it / I have an idea / no)
18. If yes, what do you think it is? (number in BDT)
19. Have you ever changed your water source because of price? (single choice: yes / no)
20. What would make you pay more for water? (multiple choice: guaranteed safe to drink / delivered to home / always available / better taste / nothing / other)

Question 14 against questions 9 to 13 is the heart of the study: it lets you compare what people think they spend with what their own answers add up to.

08 Sampling and limits

Your survey tells you about the households you reached, not about your whole city and not about Bangladesh. Say this clearly in your paper.

- **Who to recruit:** adults in a defined area, chosen by a rule (every second household) rather than by convenience. Try for a mix of housing types, because water spending differs a lot between a rented room and an own house.
- **How to choose streets:** pick streets with different conditions if you can, for example one near a main road with shops and one inside a residential block. Write down why you chose them.
- **What the sample can claim:** differences between sources, and the gap between believed and calculated spending, for the households in your sample.
- **What it cannot claim:** city-wide averages, differences between rich and poor areas you did not visit, or trends over time.
- **Non-response:** record how many households refused or were absent. Readers need this number.

09 Interview guide

Record 6 to 8 interviews of 5 to 10 minutes each, with the camera on the person (if they agree) or on the place (if they prefer not to show their face). Interview people in these roles:

- a 20-litre jar seller or delivery worker
- a shop owner who sells bottled water
- a water seller with a drum or van, if your area has one
- a household that buys most of its drinking water
- a household that uses only a tube well or piped water
- a caretaker or operator of a public tube well, water point or building pump
- if possible, a staff member of the water authority or pourashava water office

Sample questions (choose 6 to 8 per interview):

1. Where does the water you sell or use come from, and how does it reach here?
2. What do you charge, or pay, for water, and how is that price decided?
3. Has the price changed in the last year? Why?
4. Who are your customers, or who do you buy from?
5. What costs are inside the price: transport, fuel, electricity, bottles, labour?
6. Do people ask whether the water is safe? What do you tell them?
7. What happens when supply is short or the pump breaks?
8. Do you think people know what they pay for water per litre? Why or why not?
9. If you could change one thing about water supply here, what would it be?
10. Is there anything about water and money here that outsiders do not understand?

Consent script (read aloud before recording):

Bangla: আমি রেইনফ্লাওয়ার প্ল্যাটফর্মের একজন ছাত্র গবেষক। আমরা আমাদের এলাকায় পানির দাম ও খরচ নিয়ে একটি গবেষণা করছি। এই সাক্ষাৎকারটি প্রায় দশ মিনিটের। আপনার নাম বা ঠিকানা আমরা প্রকাশ করব না। আপনি তিনটি বিষয়ে আলাদাভাবে সম্মতি দিতে পারেন: এক, সাক্ষাৎকারে অংশ নেওয়া; দুই, ভিডিও রেকর্ড করা; তিন, রেকর্ডের কোনো অংশ প্রকাশ্যে ব্যবহার করা। আপনি যেকোনো সময় থামতে পারেন। আপনি কি রাজি?

English: I am a student researcher with the Rainflower platform. We are doing a study about the price and cost of water in our area. This interview takes about ten minutes. We will not publish your name or address. You can agree to three things separately: one, taking part; two, being recorded on video; three, having any part of the recording shared publicly. You can stop at any time. Do you agree?

Write the three answers (yes/no for each) in your field diary with the date, time and place.

Recording tips: hold the phone sideways, stand with the light behind you, keep the microphone close, and record 10 seconds of the surroundings first so the location is clear. Say the date and place at the start of each recording.

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10 Photo and observation plan

Turn on location (geo-tagging) in your camera settings before the first field visit. Take 20 or more photos. For each photo, write one line in your field diary: date, time, place, what it shows.

Photo ideas:

1. A price board or price list at a shop selling bottled or jar water.
2. A 20-litre jar with its brand or refill label, and the price if shown.
3. A water bill or meter from a household that agrees to show it (hide the name and account number).
4. A jar delivery van, rickshaw or cart on its route.
5. A public tube well with people collecting water, taken from a distance so faces are not clear.
6. A water ATM or vending point, if your area has one.
7. A household filter or boiling pot, with permission.
8. A water seller's drum or container and the measuring cup or jug used.
9. A building's rooftop tank and pump, with permission from the building manager.
10. A shop shelf with different bottle sizes and their prices.
11. The street where you ran the survey, to show the housing type.
12. Your team at work: holding the survey phone, measuring, or writing the field diary.

Privacy rules: never photograph a child's face. Photograph adults' faces only with permission for public sharing. Do not photograph the inside of a home without permission. Exact home locations stay in your private evidence package; the paper uses the area name only.

Observation sheet: at every point of sale, record: date, place, product (jar 20 L, bottle 500 ml, bottle 1 L, bottle 5 L, seller drum, piped tariff), price in BDT, volume in litres, and price per litre (price ÷ litres). Aim for 15 or more records from at least 5 different places.

11 Optional measurements

These are optional. They can make your paper stronger, but the study works without them.

- **Time cost:** at a public tube well or water point, time how long it takes a person to fill one container, and count how many people queue in 30 minutes. Time is a real cost of water.
- **TDS reading:** a low-cost TDS meter (BDT 800 to 1,500) gives a number for dissolved solids in jar water, tube-well water and piped water. It does **not** tell you whether water is safe to drink, and your paper must say so. It can show whether a higher price goes with a different reading.
- **Volume check:** measure a "20-litre" jar with a marked bucket or bottles to check its real volume. Report what you find; do not name the company.

12 Timeline

Plan for 13 weeks. Your AI research assistant checks each stage with you. Two stages have a human gate.

Stage	Weeks	What you do	What you submit	Gate
1. Choose and plan	1–2	Define the study area and streets. Build the AKTI survey. Write interview questions. Assign roles.	Research question, survey link, interview guide, photo plan, team roles	AI coach
2. Permission, checklist and pilot	2–3	Parental agreement. Consent script ready in Bangla and English. Pilot survey with 3–5 people.	Pilot notes and survey changes, consent script, parental confirmation	Coordinator checklist
3. First sample and advisor review	3–4	10–20 survey responses, 5 price records, 1–2 interviews, 5 photos.	AKTI export, price sheet, interview files, photos, field diary pages	Advisor review
4. Full data collection	5–8	Reach 50 responses, 15 price records, 6–8 interviews, 20 photos.	Full exports, all files, photo log, field diary	AI coach
5. Analysis	9–10	Price-per-litre table, spending comparison, charts, first findings.	Tables, charts, draft findings	AI coach
6. Write	11–12	Full paper draft with AI-use and ethics statements. "Know Your Water Price" sheet.	Draft paper, statements, awareness sheet	AI coach
7. Final review and submit	13	Before-you-submit checklist. Evidence package manifest. Short conversation explaining findings.	Final paper, manifest, author list	Coordinator checklist, then Rainflower review

13 Analysis plan

Decide this before you collect data, and do not change it afterwards without saying so in the paper.

1. **Price per litre table.** From the observation sheet, compute price ÷ litres for every record. Report the lowest, highest and middle (median) price per litre for each product type. Compare with the official piped tariff per litre (tariff per 1,000 litres ÷ 1,000) [verify tariff].
2. **Source use.** From survey questions 4 to 7, count how many households use each source for drinking, cooking and washing. Show as a bar chart.
3. **Calculated monthly spend.** For each household, add up: monthly bill (Q9) + jars per week × jar price × 4.3 (Q10 × Q11) + bottles per week × typical bottle price × 4.3 (Q12 × your observed price) + seller purchases if regular (Q13). Call this the *calculated spend*.
4. **Believed spend.** Q14 is the *believed spend*. For each household compute the gap: (believed − calculated) ÷ calculated. Report how many households are within 25% (your hypothesis test), how many guess too low, and how many guess too high. Cross this with Q15 (confidence).
5. **Awareness.** Report Q16 to Q18: how many say the price is fair, how many know the official tariff, and how close their guess is.
6. **Price sensitivity.** Report Q19 and Q20 as counts.
7. **Interviews.** Write 3 to 5 themes that appear in the interviews (for example "transport is the biggest cost inside the jar price"). Support each theme with one or two short, anonymised quotes.
8. **Limitations check.** State the sample size, the refusal count, and that results describe your sample only.

Use a spreadsheet for all counting. Keep the spreadsheet in your evidence package.

14 Ethics and safety

- **Three separate permissions** for every person: taking part, being recorded, and public sharing. A yes to one is not a yes to the others.
- **Parental agreement** for every team member before field work starts. Keep a signed or messaged confirmation.
- **Adults only** as survey respondents and interviewees. If a person under 18 wants to help you, they may, but they cannot be a respondent without a parent's agreement.
- **Privacy:** no names, phone numbers, addresses or account numbers in the paper or the awareness sheet. Bills and meters are photographed with identifying details covered.
- **Data storage:** raw survey exports, videos and original photos stay in the private evidence package, visible only to your team, your coordinator, your advisor and Rainflower reviewers. They are kept only as long as review and any journal process need them, and are deleted on request.
- **Physical safety:** work in daylight, in pairs, in public places. Tell your family where you are going. Do not enter rooftops, pump rooms, factories or water authority sites without permission. Stay away from open wells, riverbanks and fast water.

- **Honesty with sellers:** tell sellers you are a student researcher. Do not pretend to be a customer to get a price, and do not name any business in the paper when reporting a problem.

15 Expected outcomes and limitations

Expected outcomes:

- A price-per-litre table for 5 or more water products in your area, compared with the official tariff.
- A clear picture of which sources households use for drinking versus other uses, and the money and time each costs.
- A measured gap between what households believe they spend and what their own answers add up to.
- 3 to 5 themes from interviews explaining how the local water market works.
- A one-page "Know Your Water Price" awareness sheet for your community.

Limitations written in advance:

- Results describe one area and one sample, not a city or the country.
- Spending answers are self-reported and may be wrong; this is in fact part of what the study measures.
- Prices may change during the 13 weeks; record the date of every price.
- Interviewees who refuse recording are still valuable; take notes and say the interview was not recorded.
- Optional TDS readings say nothing about safety.

16 Paper outline

Write 5,000 to 15,000 words in English, plus tables, charts and the appendix. Use this structure:

1. Title, authors, school or region, date
2. Abstract (150 to 200 words)
3. Introduction and background (with 2 to 3 verified sources)
4. Research question and hypothesis
5. Methods: study area, sampling, survey, interviews, price observation, photos, ethics
6. Results: price per litre; source use; believed versus calculated spend; awareness; interview themes
7. Discussion: what the results mean, surprises, comparison with the hypothesis
8. Limitations
9. Conclusion and the awareness sheet
10. AI-use statement
11. Ethics statement
12. References
13. Appendix: survey questions, interview guide, price observation sheet, photo log

17 Budget

Cash budget: **BDT 7,000** for the team.

Item	Estimate (BDT)	Notes
Local transport for field visits	2,000	Rickshaw, bus or CNG for 8 to 10 visits
Mobile data	1,000	For AKTI Survey and uploads, shared across the team
Printing consent scripts and the awareness sheet	1,000	60 to 80 pages
Sample water purchases for price records	2,000	One jar and several bottle sizes; keep receipts, they are evidence
Optional TDS meter	1,000	Only if the team chooses the optional measurement
Total	**7,000**	

Estimated hours: about 80 hours per student across 13 weeks (planning 11, field work 34, analysis 15, writing 16, review 4). **Reward:** 2,500 raindrops for each student on the team.

18 Before-you-start checklist

- [ ] Our study area is one named ward, mahalla, union or neighbourhood, and we wrote down why we chose it.
- [ ] Every team member has a parent's or guardian's agreement.
- [ ] Our AKTI Survey is built in Bangla with the 20 questions, tested on 3 to 5 people, and fixed.
- [ ] We have the consent script in Bangla and English and know the three separate permissions.
- [ ] Location (geo-tagging) is turned on in every phone camera we will use.
- [ ] We have a field diary (paper or shared document) with columns for date, time, place, what happened.
- [ ] We have a price observation sheet with price ÷ litres ready to fill.
- [ ] We know who does what: price recorder, survey lead, interview lead, writer.
- [ ] We have read the Ethics and safety section and the Rainflower AI-use rules.
- [ ] We have found the official piped water tariff for our area and written down the source.
- [ ] We have a plan for storing raw data privately and sharing only summaries.
- [ ] We know our first-sample target for the advisor review: 10 to 20 responses, 5 prices, 1 to 2 interviews, 5 photos.

19 Glossary

- **Tariff:** the official price a water authority charges, usually per 1,000 litres.

- **Price per litre:** price ÷ number of litres; the only fair way to compare a jar, a bottle and a bill.
- **Median:** the middle value when numbers are sorted; less affected by one very high or low value than the average.
- **Self-reported:** information a person gives about themselves, which may not be exact.
- **Sample:** the group of households you actually reached; not the whole population.
- **Non-response:** people who refused or were not home; always count them.
- **Pilot:** a small test run of the survey to find confusing questions.
- **Geo-tag:** location data stored inside a photo file when location is turned on in the camera.
- **TDS:** total dissolved solids, a number from a cheap meter; not a measure of safety.
- **Willingness to pay:** the most a person says they would pay for something, often studied for safe water.
- **Informal seller:** a person who sells water without being part of a company or authority.
- **Awareness outcome:** something your study gives back to the community, here the "Know Your Water Price" sheet.

20 Submission guide

Submit through your claim page on Rainflower, one stage at a time. Each stage opens when the previous one has passed. Your AI research assistant reviews every submission within a day and tells you what is met, what needs work, and what to do next. Stage 2 waits for your coordinator's checklist; stage 3 waits for your advisor's review; stage 7 goes to the coordinator's final checklist and then to Rainflower review and grading.

At stage 7 your evidence package manifest must list: the AKTI Survey export (CSV), the price observation sheet, every interview file with its date, place and the three consent answers, every photo with its log line, the field diary, the analysis spreadsheet, and the final paper. Keep the originals; upload the manifest and the files Rainflower asks for.