

## Supplementary material

### Household survey protocol for the study of: "Water supply and community resilience in Amman, Jordan"

<b>Interviewer:</b>			
<b>Location of survey (geo-tagged)?</b>	<input type="checkbox"/> yes	<input type="checkbox"/> no	
<b>District:</b>		<b>Map code/location:</b>	
<b>Date:</b>			
<b>Interviewee is:</b>	<i>head of household?</i>	<input type="checkbox"/> yes	<input type="checkbox"/> no
		<input type="checkbox"/> male	<input type="checkbox"/> female
<b>household is</b>	<input type="checkbox"/> wealthy	<input type="checkbox"/> medium	<input type="checkbox"/> poor

**Intro:** Thank you for taking the time to talk to us today. My name is ..... This survey is part of a research project conducted in partnership between Purdue University in the United States, Helmholtz Centre for Environmental Research - UFZ in Germany, and University of Jordan in Amman.

The project investigates water supply reliability in Amman and adaptation strategies to deal with water supply delays or shortages. We hope that with your contribution, this project will help to identify strategies for improving water supply reliability and community resilience in the long-term.

This survey has five sections (A-E), and broadly, we will ask questions about how you and your household members experience problems with water supply, how you manage these problems, and what you conceive to be the most pressing water supply issues in Amman.

Everything we discuss during this survey interview will be kept strictly confidential, and your name and identity will not be revealed to anyone beyond the research team.

If you have any questions or concerns, please contact:  
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## SECTION A: Water Supply Reliability

### 1. Do you generally experience water shortages, or other problems around water supply in this household?

<input type="checkbox"/> no, never	<input type="checkbox"/> rarely: once every one or two years	<input type="checkbox"/> occasionally: once every one of two months	<input type="checkbox"/> yes, regularly: once every one of two weeks
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### 2. Do you experience delays in the delivery of piped water?

Please enter number of times for each period

<input type="checkbox"/> no	<input type="checkbox"/> yes	if yes, please quantify	
<input type="checkbox"/> winter	<input type="checkbox"/> summer	<input type="checkbox"/> during Ramadan	
times per week, or	times per week, or	times per week, or	
times per month, or	times per month, or	times per month, or	
times per year	times per year	times per year	

### 3. How long is the delay usually? Average delay time (please check):

Throughout the year			During Ramadan or summer period		
<input type="checkbox"/> half a day or less	<input type="checkbox"/> 1 day	<input type="checkbox"/> 2 days	<input type="checkbox"/> half a day or less	<input type="checkbox"/> 1 day	<input type="checkbox"/> 2 days
<input type="checkbox"/> other, please specify:					
a) What was the longest delay you experienced in the last 5 years (please specify number of days):					

### 4. What do you usually do when there is a delay in water delivery?

<input type="checkbox"/> contact Miyahuna	<input type="checkbox"/> contact the Water Ministry
<input type="checkbox"/> buy water from a store	<input type="checkbox"/> call a water truck
<input type="checkbox"/> borrow water from the neighbor /other person	<input type="checkbox"/> other, please specify:

<b>5. Have you experienced any pipe bursts in your street/neighborhood?</b> If yes:		<input type="checkbox"/> yes		<input type="checkbox"/> no	
<b>a) When was the last time?</b>			month		year
<b>b) How often during the past year:</b>					
<b>c) On average, how long does it take to repair the pipe burst? Please indicate number of hours or days:</b>					
<b>d) Who repairs it usually?</b>					
<b>e) Have pipe bursts become more frequent over the last 5 years?</b>		<input type="checkbox"/> yes		<input type="checkbox"/> no	

<b>6. Do you sometimes help others out when they run out of water?</b>					
<input type="checkbox"/> yes			<input type="checkbox"/> no		
<b>If yes, how often do you give water to others?</b> Please indicate how many times per week/month or year.					
	per week		per month		per year

<b>7. Have you experienced any changes in the amount or reliability of <u>piped</u> water supply in the last 5 years?</b>					
amount:			reliability:		
<input type="checkbox"/> yes	<input type="checkbox"/> no		<input type="checkbox"/> yes	<input type="checkbox"/> no	
if yes, now there is:			if yes, now supply is:		
<input type="checkbox"/> more water	<input type="checkbox"/> less water		<input type="checkbox"/> more reliable	<input type="checkbox"/> less reliable	

<b>8. Have you experienced any changes in the amount or reliability of <u>trucked</u> water supply in the last 5 years?</b>					
amount:			reliability:		
<input type="checkbox"/> yes	<input type="checkbox"/> no		<input type="checkbox"/> yes	<input type="checkbox"/> no	
if yes, now there is:			if yes, now trucked water supply is:		
<input type="checkbox"/> more trucked water	<input type="checkbox"/> less trucked water		<input type="checkbox"/> more reliable	<input type="checkbox"/> less reliable	

## SECTION B: Adaptation

9. On which days of the week do you usually get piped water service?						
In summer:						
<input type="checkbox"/> Sunday	<input type="checkbox"/> Monday	<input type="checkbox"/> Tuesday	<input type="checkbox"/> Wednesday	<input type="checkbox"/> Thursday	<input type="checkbox"/> Friday	<input type="checkbox"/> Saturday
<i>indicate morning /evening</i>						
In winter:						
<input type="checkbox"/> Sunday	<input type="checkbox"/> Monday	<input type="checkbox"/> Tuesday	<input type="checkbox"/> Wednesday	<input type="checkbox"/> Thursday	<input type="checkbox"/> Friday	<input type="checkbox"/> Saturday
<i>indicate morning /evening</i>						

10. How do you store water in this household?		
<input type="checkbox"/> roof-top	<input type="checkbox"/> basement	<input type="checkbox"/> other, please specify:

11. Do you share this storage with others or is it your own storage?		
<input type="checkbox"/> own storage	<input type="checkbox"/> shared with other households	If shared, how many households share it?:

12. What is the size of water storage capacity for this household:				
	liters	OR		cubic meters

12a) How often do you clean the water storage of this household?				
<input type="checkbox"/> Once per year	<input type="checkbox"/> Once every two years	<input type="checkbox"/> Once every 3-5 years	<input type="checkbox"/> Never	<input type="checkbox"/> Other, please specify:

13. Is this storage sufficient for the whole week?		
In winter	<input type="checkbox"/> yes	<input type="checkbox"/> no
In summer	<input type="checkbox"/> yes	<input type="checkbox"/> no
during Ramadan	<input type="checkbox"/> yes	<input type="checkbox"/> no

14. Do you harvest rainwater from the roof?				
<input type="checkbox"/> yes		<input type="checkbox"/> no		
If yes, what is the size of rainwater harvesting storage on the roof?				
	liters	OR		cubic meters

15. How much of your weekly water consumption is covered by piped water supply? Please specify in %, or choose one of the following:					
In winter:		%	<input type="checkbox"/> less than 50 %	<input type="checkbox"/> 50-90 %	<input type="checkbox"/> 100 %
In summer:		%	<input type="checkbox"/> less than 50 %	<input type="checkbox"/> 50-90 %	<input type="checkbox"/> 100 %
during Ramadan:		%	<input type="checkbox"/> less than 50 %	<input type="checkbox"/> 50-90 %	<input type="checkbox"/> 100 %

*If "100 %" for all times, proceed to Q19.*

16. How often do you buy water from other sources? Please specify number of times						
In winter:		times per week, or		times per month, or		times per year
In summer:		times per week, or		times per month, or		times per year
During Ramadan:		times per week, or		times per month, or		times per year

17. Where do you get this additional water from? (check all that apply)		
<input type="checkbox"/> store	<input type="checkbox"/> tanker truck	<input type="checkbox"/> other, please specify :
a) If tanker: How do you notify the tanker driver of your water need?		
<input type="checkbox"/> by phone	<input type="checkbox"/> waive them off the street	
For getting truck water, I ask for help from (please indicate)		
<input type="checkbox"/> a relative	<input type="checkbox"/> an acquaintance	
<input type="checkbox"/> close friend	<input type="checkbox"/> a neighbor	
<input type="checkbox"/> other, please specify:		
b) Are you familiar with the truck driver?		
<input type="checkbox"/> yes	<input type="checkbox"/> no	
c) Each time you buy water from a truck, is it the same driver?		
<input type="checkbox"/> yes, always <input type="checkbox"/> yes, except during summer or Ramadan	<input type="checkbox"/> no	
d) If no, can you specify how many different truck drivers you buy water from?		
e) How long does it usually take for the tanker truck to arrive after notifying the driver? Please specify how many hours or days		
	hours, or	days

	hours during summer / Ramadan, or		days during summer / Ramadan
<b>f) How much water do you usually buy from the tanker driver?</b>			
	<input type="checkbox"/> liters at price: or <input type="checkbox"/> m3 at price:		JD per liter/m3
<b>g) <u>If from the store:</u> How much water do you buy from the store?</b>			
Please specify amount per week or month			
	liters per week		liters per month

<b>18. When you buy water from a tanker truck, do you usually arrange with your neighbors to share the tanker water?</b>	
<input type="checkbox"/> yes	<input type="checkbox"/> no
<b>If no, can you store the whole truck load in your household storage?</b>	
<input type="checkbox"/> yes	<input type="checkbox"/> no

**19. Could you please name at least 5 people, whom you contact or interact with concerning water issues around the house?**

	First name of person (only!)	your relation to this person (e.g., relative, friend, neighbor)	role of that person for solving water problem	frequency of contacting person (times per day/week/month or year)
1				
2				
3				
4				
5				
6				

**Prompt:** Who do you call when there is a water delay?

**Prompt:** Do you need any help filling the water tank, when water arrives - who do you call then?

**Prompt:** Who do you call when you need to buy additional water?

**Prompt:** Who do you talk to when you are concerned about water quality?

**Prompt:** Have you experienced a pipe burst in your house or neighborhood? Whom did you contact?

**a) Do these people interact with one another on water issues (y/n)?**  
**How do these people know each other (e.g. relatives, friends, neighbors, customers)?**

name (from Q18)	1	2	3	4	5	6
1		(y/n)	(y/n)	(y/n)	(y/n)	(y/n)
2			(y/n)	(y/n)	(y/n)	(y/n)
3				(y/n)	(y/n)	(y/n)
4					(y/n)	(y/n)
5						(y/n)
6						

**SECTION C: Water Quality Concerns**

<b>20. Do you drink the piped water?</b>		
<input type="checkbox"/> yes	<input type="checkbox"/> no	
<b>If yes, do you treat the water before drinking?</b>		
<input type="checkbox"/> yes	<input type="checkbox"/> no	
<b>If yes, please indicate method of treatment:</b>		
<input type="checkbox"/> boiling	<input type="checkbox"/> filtering	<input type="checkbox"/> other, please specify:

<b>21. Do you drink the tanker truck water?</b>		
<input type="checkbox"/> yes	<input type="checkbox"/> no	
<b>If yes, do you treat the water before drinking?</b>		
<input type="checkbox"/> yes	<input type="checkbox"/> no	
<b>If yes, please indicate method of treatment:</b>		
<input type="checkbox"/> boiling	<input type="checkbox"/> filtering	<input type="checkbox"/> other, please specify:

<b>22. Have you experienced any health problem from drinking water?</b>		
from piped water:	<input type="checkbox"/> yes	<input type="checkbox"/> no
from tanker truck water:	<input type="checkbox"/> yes	<input type="checkbox"/> no
if yes, please specify:	<input type="checkbox"/> diarrhoea	<input type="checkbox"/> other, please specify:

<b>23. Have you had any other problems with water quality (smell, color, etc.)?</b>		
<input type="checkbox"/> no	<input type="checkbox"/> yes	If yes, please specify:



## SECTION D: Long-term Issues

**24. What do you think are the greatest challenges to the long-term, reliable water supply in Amman?** In the list below, please answer 'yes', if you agree this is a problem, and 'no' if you think it is not a problem:

Issue	Problem?
leakages in the supply network	<input type="checkbox"/> yes <input type="checkbox"/> no
the private water market (tanker trucks)	<input type="checkbox"/> yes <input type="checkbox"/> no
water quality (now or potentially in the future)	<input type="checkbox"/> yes <input type="checkbox"/> no
rationing system/ intermittent supply	<input type="checkbox"/> yes <input type="checkbox"/> no
wasteful domestic water use	<input type="checkbox"/> yes <input type="checkbox"/> no
inequality of water supply to consumers within Amman	<input type="checkbox"/> yes <input type="checkbox"/> no
scarcity of water resources in Jordan	<input type="checkbox"/> yes <input type="checkbox"/> no
agricultural water use	<input type="checkbox"/> yes <input type="checkbox"/> no
illegal water abstractions	<input type="checkbox"/> yes <input type="checkbox"/> no
illegal water market (re-selling legally abstracted water)	<input type="checkbox"/> yes <input type="checkbox"/> no
wasteful management of water resources and non-revenue water	<input type="checkbox"/> yes <input type="checkbox"/> no
increasing demand due to population growth	<input type="checkbox"/> yes <input type="checkbox"/> no
increasing demand due to refugees	<input type="checkbox"/> yes <input type="checkbox"/> no
Are prices for piped water too high in Amman?	<input type="checkbox"/> yes <input type="checkbox"/> no
Do you think the price of water is realistic compared to the cost for operation and maintenance?	<input type="checkbox"/> yes <input type="checkbox"/> no
Should water and energy be jointly managed, and if so, do you think there is a lack of coordination?	<input type="checkbox"/> yes <input type="checkbox"/> no
Other problems:	

<b>25. Do you think rainwater harvesting, or water reuse are potential solutions to Amman's water problems?</b>	<input type="checkbox"/> yes <input type="checkbox"/> no
Do you have a rainwater harvesting device in your home?	<input type="checkbox"/> yes <input type="checkbox"/> no

**26. Please list three things that would improve your situation in terms of water supply reliability and/or quality**

Change / action for improvement	Who would be responsible for making this change?

**27. Water-saving can improve overall water availability for all in Jordan. If you had to reduce the water consumption in your household, how much water or what water-intensive activity would you be able to save?**

Amount of water to be saved:	<input type="checkbox"/> 10%	<input type="checkbox"/> 20%	<input type="checkbox"/> 30%	<input type="checkbox"/> 40%	<input type="checkbox"/> none
<b>Water-intensive activity to give up/save water on:</b>					
<input type="checkbox"/> watering plants	<input type="checkbox"/> cleaning around the house	<input type="checkbox"/> laundry	<input type="checkbox"/> if other, please specify:		

**28. What would be an adequate compensation for you to save water?**

<input type="checkbox"/> tax saving	<input type="checkbox"/> lower water price	<input type="checkbox"/> more reliable supply	<input type="checkbox"/> other, please specify:
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## SECTION E: Personal Information

<b>29. How many members live in this household?</b>	adults:	
	children:	

<b>30. For how long have you been living in Amman?</b>			
<input type="checkbox"/> less than 6 months	<input type="checkbox"/> less than 1 year	<input type="checkbox"/> less than 5 years	<input type="checkbox"/> more than 5 years

<b>31. Where did you move from?</b>		
<input type="checkbox"/> from within Jordan	<input type="checkbox"/> from abroad. From which country?:	<input type="checkbox"/> I've always lived in Amman

<b>32. What is the average <u>monthly</u> income of this household?</b>	
<input type="checkbox"/> less than 500 JD	<input type="checkbox"/> 2000 - 3000 JD
<input type="checkbox"/> 500 - 1000 JD	<input type="checkbox"/> 3000 - 5000 JD
<input type="checkbox"/> 1000 - 2000 JD	<input type="checkbox"/> more than 5000 JD

<b>33. How much is the quarterly water bill for this household?</b>
JD

<b>34. Do you usually pay for your water bill on time, or do you have problems paying for the bill?</b>	
<input type="checkbox"/> yes, I usually pay on time	<input type="checkbox"/> I have problems paying for the bill

<b>30. We would like to conduct this survey with other households in this district and in other areas of Amman, in particular with households who experience problems with water supply. Could you name any other household/family, who you know experiences such problems? If yes, what is their name and address?</b>

Thank you for participating in this survey.