

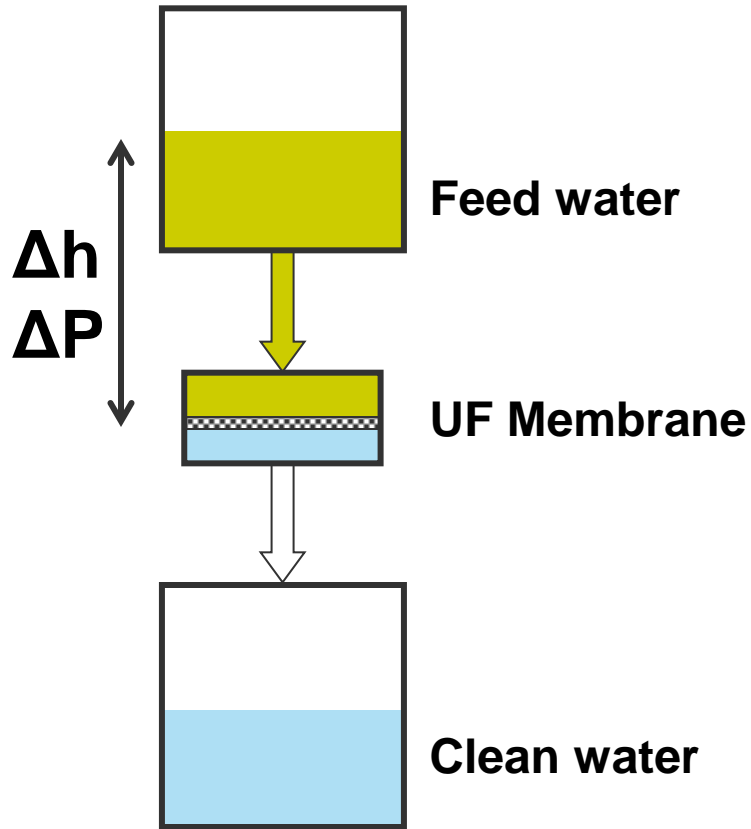
User Perceptions and Willingness to Pay for Gravity Driven Membrane Technology

Nakuru, Kenya

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Gravity Driven Membrane (GDM) filtration



No backwashing
No cleaning



Second generation GDM filters

- 2-5 litres per hour
- 0.5 m² ultrafiltration membrane
- Plastic housing unit

- Urban markets
 - Filling centres

- Rural markets
 - Different distribution and marketing channels

- Approximate cost \$40
- Willingness to Pay?
 - Rural? Urban?



Study design

Nakuru Region

Urban Nakuru town
Piped water supply

Rural Njoro district
Surface water, wells, streams

150 hh per area

Survey

Demographics
Water and Sanitation
Description of GDM filter
Choice Experiment, Payment Card
Socioeconomic questions

Pretesting (3 test rounds, 180 households)



Study design

Choice Experiments

Three non-price variables







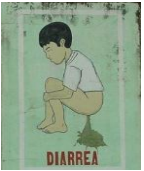

- Time to treat 1 L (15, 30, 45 minutes)
- Storage capacity (1, 5, 10 L)
- Diarrhea prevalence (4, 2, 1 cases/yr)

Price (5 levels, \$25 - \$50 per GDM filter)

Thirty sets of five choice tasks

- D-efficient fractional factorial design
- Sawtooth

Mixed Logit analysis

1-1		Filter A	Filter B	
	Time to treat 1 litre	 45 minutes	 30 minutes	
	Storage capacity	 1 litre	 5 litres	
	Diarrhoea prevalence	One time per child per year	Four times per child per year	
	Price (Ksh)	Ksh 2000	Ksh 2500	
Which option do you prefer?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> None of the two

Study design

Contingent Valuation

Characteristics

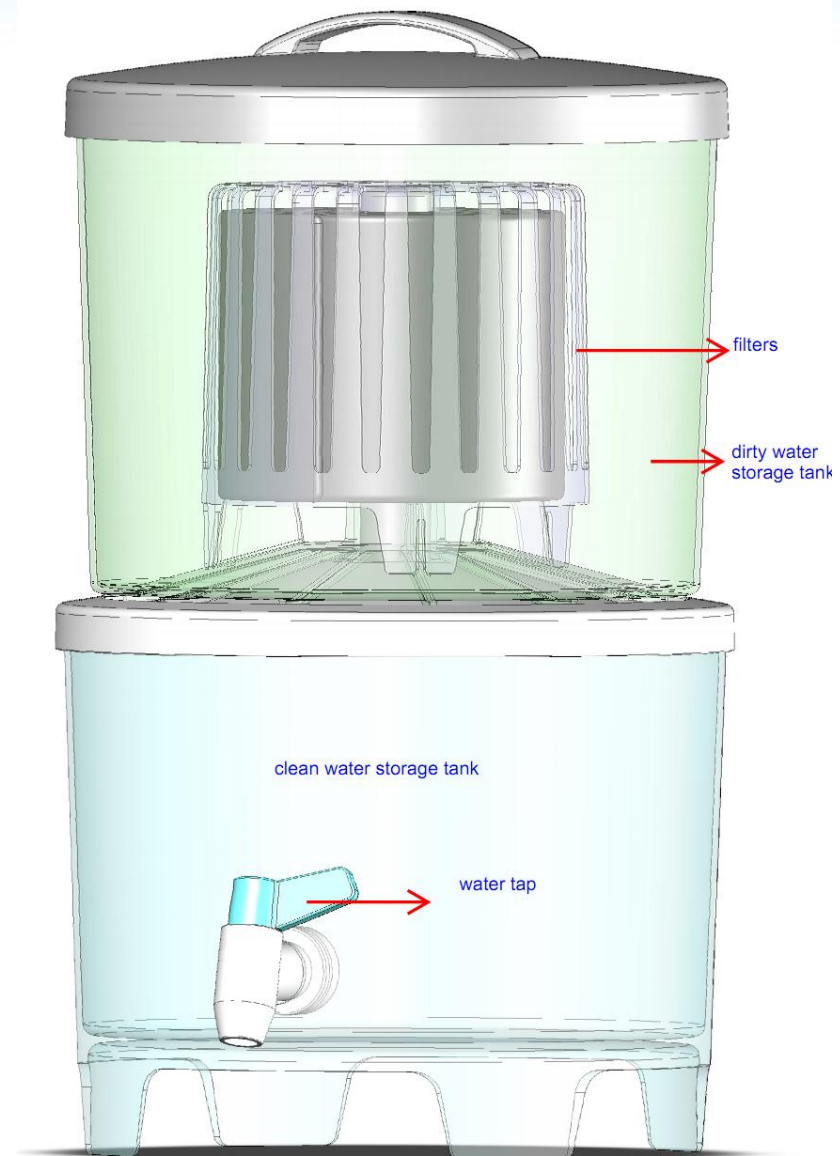
- 30 minutes to treat 1 litre
- 10 litres storage
- Diarrhea reduced from 4 to 1 episodes per year

What would be the maximum amount you would pay?

Payment card format

35 bids

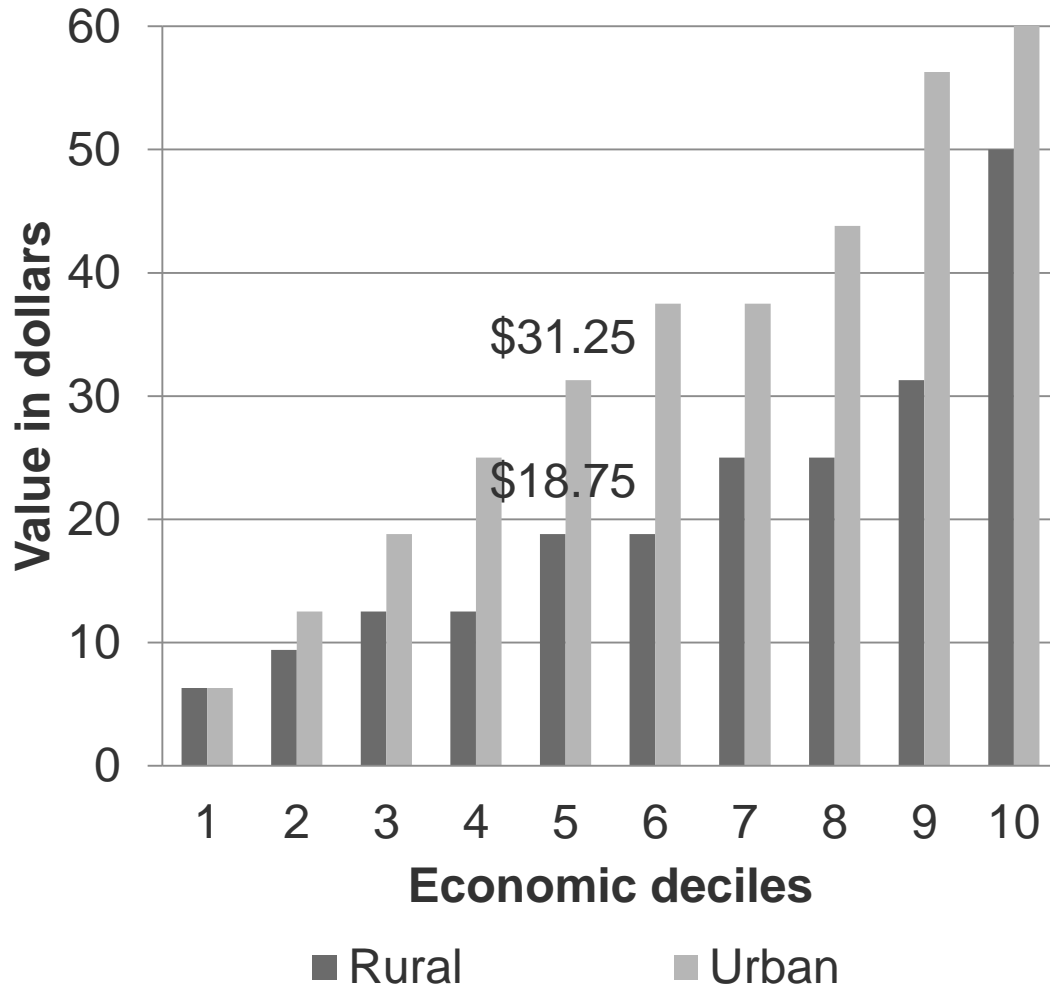
- (\$0,\$3,\$70)
- then larger steps to \$175



Results

Contingent Valuation

WTP by economic deciles

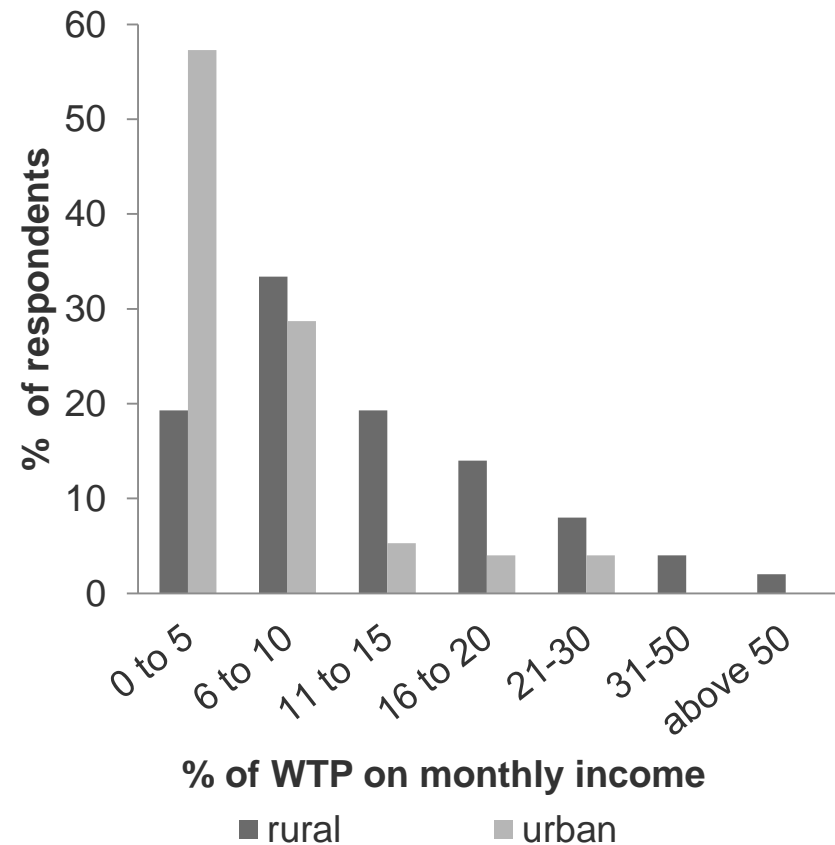


%ile	Per capita annual income (USD)	
	Rural	Urban
10	126	289
20	180	570
30	239	871
40	310	1,500
50	375	1,994
60	450	2,495
70	526	3,484
80	780	4,852
90	1,033	7,310
100	7,463	15,000

Results

Contingent Valuation

- WTP as fraction of income greater in rural areas
- WTP significantly higher when...
 - Higher income
 - Higher age
 - More education
 - Male respondent
 - Higher water use
 - User of improved sanitation



Results

Choice Experiments

Marginal WTP

Mean WTP

	Nakuru	Njoro		Nakuru	Njoro
Flow rate (15 minutes)	\$2	\$0.60	CV	\$28	\$17
Storage (10 litres)	\$25	\$4			
Diarrhea (times/yr)	\$31	\$19			

Results

Choice Experiments, Multi Logit Model

Choice Attributes	β	Standard Error
Flow rate (minutes)	-0.005	-0.005
Storage capacity (litres)	0.089***	0.020
Diarrhea prevalence (times/year)	-1.751***	0.142
Price of filter (KSH)	-8e-4***	1e-4
Covariates		
District (1=Njoro)	1.372***	0.546
Household income (KSH/month)	-0.515e-5**	0.26e-5

Pseudo-r² 0.508

N=1500

Discussion

Challenge of collinearity

Rural, poor, surface water

Urban, wealth, piped water

CV and CE estimates differ substantially

CV: Urban > Rural

CE: Rural > Urban

CE is more sophisticated, less prone to respondent bias