

# Impact of drinking saline water on developing hypertension among pregnant women in coastal areas of Bangladesh

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## BACKGROUND

- Bangladesh stands at the forefront of climate change, with its coastal region exposed to sea-level rise and coastal flooding over the last three decades. This is linked with increasing salinity detected in groundwater; 98% of households access this water for drinking via tube-wells.
- Hypertensive disorders in pregnancy such as pre-eclampsia and eclampsia have serious adverse effects on maternal health outcomes, but the mechanisms and risk factors are poorly understood.
- This study followed a cohort of women at two time points in their pregnancy, testing their blood pressure as well as the salinity levels of their drinking water.
- Findings suggest that hypertension is more likely to develop among pregnant women exposed to high salinity drinking water, a major concern as groundwater salinity is increasing in many coastal regions due to sea level rise, coastal intrusion, and over abstraction of groundwater for irrigation.

## METHODS

- ❑ This analysis uses a sub-set sample of a baseline survey used in a larger non-experimental prospective cohort study.
- ❑ The sub sample consists of 779 pregnant women aged 18-49 years interviewed in 5 selected coastal unions of Dacope upazila, Khulna district of Bangladesh from September 2018 to March 2019.
- ❑ A door-to-door listing activity was conducted over the course of three months to identify all pregnant women. Women less than 20 weeks of pregnancy were eligible for inclusion. Once enrolled, the women were followed up at three points, about 20 weeks, at 34 weeks of pregnancy and within 45 days at postpartum.
- ❑ Blood pressure was recorded, and urine samples obtained to check for albumin. Household drinking water sources were tested to identify the level of salinity using a TDS meter. Data were analyzed using STATA 15.1.

## RESULTS

### Pregnant women background characteristics at baseline (= <20 weeks pregnancy) [N=779]

Variables	n	%
<b>Age (year)</b>		
<20	231	29.6
20-24	279	35.8
25-29	166	21.3
30-34	84	10.9
>=35	19	2.4
<b>Education</b>		
No education	24	3.1
Primary	131	16.8
Secondary	496	63.7
Higher secondary	87	11.2
Graduation	41	5.3
<b>Parity</b>		
Prime	391	50.2
1	318	40.8
>=2	70	9.0
<b>Staying in the coastal area (year)</b>		
<5 years	291	37.4
5-9 years	147	18.8
>=10 years	108	13.9
Since birth	233	29.9

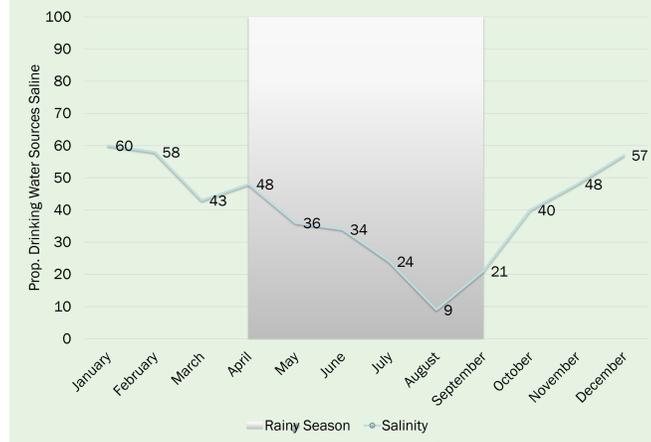
### Association of salinity of household drinking water with blood pressure by follow-up

Variables	Salinity of household drinking water			P value <sup>a</sup>
	BL(20 weeks pregnancy) [n=393]	1st follow-up (34 weeks pregnancy) [n=390]	2nd follow-up (6-7 weeks postpartum) [n=306]	
Normal BP (sBP: <120 mmHg and dBP:<80 mmHg)	352(89.5)	327(83.8)	251(82.0)	<0.001
Elevated BP (sBP: 120-129 mmHg and dBP:<80 mmHg)	13(3.3)	22(5.6)	18(5.9)	
Stage 1 hypertension (sBP: 130-139 mmHg / dBP:80-89 mmHg)	22(5.6)	31(7.9)	24(7.8)	
Stage 2 hypertension (sBP: >=140 mmHg / dBP: >=90 mmHg)	6(1.5)	10(2.6)	13(4.3)	

### Comparison of blood pressure and urine albumin of pregnant women over time [N=609]

Variables	Baseline (= <20 weeks pregnancy) n (%)	1st follow-up (34 weeks pregnancy) n (%)	2nd follow-up (6 weeks postpartum) n (%)	P value <sup>a</sup>
<b>Blood Pressure</b>				
Normal BP(sBP: <120 mmHg and dBP:<80 mmHg)	548 (89.9)	525 (86.2)	522 (85.7)	<0.001
Elevated BP(sBP: 120-129 mmHg and dBP:<80 mmHg)	19 (3.1)	27 (4.4)	24 (3.9)	
Stage 1 hypertension (sBP: 130-139 mmHg / dBP:80-89 mmHg)	30 (4.9)	42 (6.9)	42(6.9)	
Stage 2 hypertension (sBP: >=140 mmHg / dBP: >=90 mmHg)	12(1.9)	15(2.5)	21(3.6)	
<b>Proteinuria</b>				
Nil	604(99.2)	607(99.7)	604(99.2)	<0.001
Significant	5(0.8)	2(0.3)	5(0.8)	

### Proportion of drinking water with high salinity by month



## FINDINGS

- 65% of the respondents were 18-24 years old and 50% were experiencing pregnancy for the first time.
- 65% respondents used saline water for drinking and cooking throughout the pregnancy period.
- Overall rate of hypertension with use of any form of water is 7%, 9.5% and 10.5% respectively in baseline (before 20 weeks), 1st follow up (32-34 weeks) and 2nd follow up (6 weeks post-natal) surveys.
- Rate of developing HTN among women who used only saline water was around 7%, 10.5% and 12% in the respective surveys.
- Rate of developing hypertension among pregnant women gradually increased over the pregnancy period as well as post-partum.

## CONCLUSION

- ✓ The rate of developing hypertension was found to be increased with pregnancy days proceed and it was highest after 6 weeks of post-partum.
- ✓ This study found a strong relationship between drinking water salinity and development of hypertension in a cohort of pregnant women in coastal Bangladesh.
- ✓ It also suggest a seasonal pattern in drinking water salinity, with higher salinity recorded in the dry season.
- ✓ This highlights the need to increase access to fresh drinking water in the region, to address the risk of adverse pregnancy outcomes.

## FOR MORE INFORMATION

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