

Socio-economic correlates of drinking water collection in India: A gender - based analysis from national sample survey, 2018

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Abstract

This study analyses women's role in collecting drinking water for households in India and to find out the socio-economic and demographic factors influencing the same. Data from nationally representative sample of 34,132 households surveyed in 76th round of the National Sample Survey Organization of India constitute the basis for the analysis. Bi-variate analysis and GIS mapping have been used to show the district level variation and Multinomial Logistic Regression (MLR) identifies the associated socio-economic and demographic factors in determining women's water fetching behaviour in the household. The share of women in water collection from an outside source varies significantly with their socio-cultural and economic situation as well as with respect to their place of residence. Households in favourable economic situation and social positions have far fewer women involved in fetching water as compared to the others.

Keywords: *Drinking water, gendered analysis, socio-economic correlates, NSSO, water fetching behaviour*

Introduction

The distribution of water across the world is highly uneven and its access even more unequal. Access to water is considerably less secure in the global south as compared to the global north. Environmental, physical and structural issues like terrain and topography; population density; poverty, caste; and several other infrastructural issues like water supply schemes, erratic power supply, poor maintenance, poor sanitation structure etc. are influential in determining the access to drinking water (Krishnan, Suruchi et. al., 2003). Though an important issue in public policy what appears to be an under studied dimension in accessing drinking water at the household level is the intersection of gender,

class and regional identities in availing this important resource on a daily basis. In most societies, it requires significant amount of time and effort to fetch water during times of water scarcity (Cleaver & Elson, 1995; Cain & Mulenga, 2009).

The women in global south are primarily responsible for collecting water for domestic use - for cooking, cleaning, washing clothes, caring for the sick, elderly and children etc. Garcia (2019) rightly observes that "due to its social significance, water is unquestionably intertwined with social dynamics, including gender roles". This shapes the use and collection of water wherein women are traditionally associated with the private,

domestic sphere, and the governance of water resources, associated with men in the public, monetary sphere. The gendering of water burden in India also gets intertwined with the age-old social hierarchy of the caste system where entrenched local patriarchy creates differential accessibilities for women across different castes. In rural India, water has been a traditional medium of exclusion (Krishnaraj, 2011). Certain caste groups who are traditionally considered ‘polluted’ in the caste hierarchy of the Indian society are often excluded from primary water sources by the upper castes. This exclusion leads to inaccessibility of water for the women hailing from the ‘lower’ castes. The binary generated by the gendered constructions of “*public–masculine and private–feminine*” come into conflict with each other when women are forced to fetch water from public spaces where the source of safe water might be located. Within public spaces, the notions of “*ijjat* (honour) and *lajja/sharam* (shame)” are often used to regulate female bodies thereby limiting their mobility as well as their dress code and behaviour (Domosh and Seager, 2001). In order to make a unified effort to solve the global water problems, understanding the ‘everyday negotiations’ surrounding water is particularly important

(Goldman, 2005, 2007). While usage of water in irrigation or other economic purposes has attracted greater scholarly attention, the complexity over access to domestic water is rarely taken with as much seriousness (Crow & Sultana, 2002).

In this context, the study aims to assess women’s role in fetching drinking water for the household in India and the manner in which its access varies according to women’s positions in the social, economic and demographic hierarchies.

Access to drinking water

The NSS data gives an overview of the inequality in access to principal sources of drinking water. It indicates that location of principal sources of drinking water and its distance from household clearly varies across the various socio-economic classes.

It is clear from Table 1 that two thirds of the households have drinking water source located within the household premise. The rural urban divide is however striking. Significantly, a fifth of all urban household’s access drinking water from sources located outside the household premise. The proportion of such households is much higher (41%) in rural areas (Table 1). Similarly, the disparity

Table 1: Distance to Principal source of drinking water from households, 2018

	Rural	Urban	Total
Within Premise	58.2	80.7	65.9
within dwelling	27.5	56.1	37.3
outside dwelling but within the premise	30.7	24.6	28.6
Outside premise	41.8	19.3	34.1
less than 0.2 km	30.4	13.8	24.7
0.2 to 0.5 km	8.4	3.2	6.6
0.5 or more	3.1	2.3	2.8

Source: NSSO, 76th round, 2018

Table 2: Distance to principal source of drinking water by social groups, 2018

	Rural				Urban			
	ST	SC	OBC	Other	ST	SC	OBC	Other
Within premise	31.86	53.29	62.85	68.82	69.55	71.39	81.21	84.58
within dwelling	10.74	24.61	30.66	33.63	42.72	44.86	51.77	66.13
outside dwelling but within premise	21.12	28.68	32.19	35.19	26.83	26.53	29.44	18.44
Outside premise	68.14	46.71	37.15	31.18	30.45	28.61	18.79	15.42
outside premise: less than 0.2 km	47.23	35.60	27.10	22.08	20.38	21.24	13.46	10.96
0.2 to 0.5 km	16.40	8.30	7.33	5.94	6.36	4.77	3.12	2.44
0.5 km or more	4.51	2.81	2.73	3.16	3.70	2.60	2.22	2.02

Source: NSSO, 76th round, 2018

Table 3: Distance to principal source of drinking water from household by economic status, 2018

	Rural				Urban			
	Poor	Middle	Richer	Richest	Poor	Middle	Richer	Richest
Within premise	53.23	59.13	61.32	74.02	62.24	71.87	77.89	86.25
within dwelling	24.41	27.20	29.27	42.19	37.40	44.14	49.33	64.15
outside dwelling but within premise	28.82	31.94	32.05	31.83	24.85	27.74	28.56	22.10
Outside premise	46.77	40.87	38.68	25.98	37.76	28.13	22.11	13.75
outside premise: less than 0.2 km	34.89	30.01	26.69	16.43	29.25	21.61	16.12	9.12
0.2 to 0.5 km	9.15	7.85	8.34	6.04	5.75	4.20	3.70	2.46
0.5 km or more	2.73	3.01	3.65	3.50	2.76	2.32	2.28	2.17

Source: NSSO, 76th round, 2018

noticed among different social and economic classes is staggering. About 31 percent of the Scheduled Tribes (ST), 53 percent of the Scheduled Castes (SC) compared to 69 percent of the ‘Others’ has access to principal water sources within the household in rural areas. In contrast, about 69 percent of STs, 71 percent of SCs and 84 percent in the ‘Others’ category avails the facility within the household in the urban areas (Table 2). Across economic classes (Table 3), people belonging to the poorest quartile have comparably less access (rural-53%, urban- 62%) to drinking

water within their premise compared to the richest quartile (rural-74%, urban-86%). On an average, a rural household member has to travel more than 3 kms (30 minutes daily) to fetch water every day which works out to almost 1000 kms a year depriving them time from paid work and leisure (Kapil 2019).

Table 4 shows that about a quarter of all households use public sources of drinking water. In rural areas the share of such households is higher (31%) than their urban counterparts (11%). Needless to emphasise,

Table 4: Access to principal source to drinking water to the household in India, NSSO (2018)

	Rural	Urban	Total
Exclusive use of household	48.64	57.52	51.68
Common use of households in the building	9.17	16.33	11.62
Neighbour's source	4.01	1.72	3.23
Public source	31.41	10.75	24.34
Private source	1.23	0.75	1.06
Others	5.53	12.93	8.06

Source: NSSO, 76th round, 2018

Table 5: Access to principal source to drinking water by social groups, 2018

	Rural				Urban			
	ST	SC	OBC	Other	ST	SC	OBC	Other
Exclusive use of household	25.46	44.21	52.85	57.70	44.46	47.09	54.82	65.52
Common use of households in the building	6.94	9.22	9.31	10.13	19.63	17.97	18.13	13.43
Neighbour's source	4.19	4.62	4.00	3.33	2.42	2.24	2.12	1.03
Public source	56.44	36.45	26.83	21.43	18.41	18.17	9.63	8.56
Private source	1.95	1.11	1.32	0.75	0.65	1.53	0.91	0.31
Others	5.02	4.39	5.69	6.67	14.42	13.00	14.39	11.15

Source: NSSO, 76th round, 2018

Table 6: Access to principal source to drinking water by per capita monthly consumer expenditure, 2018

	Rural				Urban			
	Poor	Middle	Richer	Richest	Poor	Middle	Richer	Richest
Exclusive use of household	43.75	49.34	52.93	62.08	45.20	53.56	55.94	60.67
Common use of households in the building	9.96	9.38	7.55	8.31	16.06	15.87	17.70	15.83
Neighbour's source	4.90	4.17	2.64	2.08	3.82	3.16	2.22	0.90
Public source	37.56	29.88	26.70	15.74	29.72	19.86	13.09	5.28
Private source	1.12	1.20	1.58	1.01	0.83	0.81	1.25	0.50
Others	2.71	6.03	8.60	10.78	4.37	6.73	9.82	16.82

Source: NSSO, 76th round, 2018

the lack of drinking water source within the premises of the households in India leads to greater dependency on public sources especially for the socially and economically marginalised. In rural areas, about 56 percent of ST and 36 percent of SC households use public sources for drinking water compared to only 21 percent of 'Others' category (Table 5). Only about 9 percent of the households in 'others' category uses public sources, while about 18 percent of the most marginalised groups (both SC and ST) are dependent on public sources. Poorest households in both rural and urban areas (about 37% in rural areas and 30% in urban areas) are also more dependent on public sources compared to the richest quartile (about 15% in rural areas and only 5% in urban areas) (Table 6).

Methods

Data source and sample size

The study is based on the available data from 76th Round of the National Sample Survey Organization (NSSO) on 'Drinking Water, Sanitation, Hygiene and Housing Condition' on a nation-wide survey held between July and December 2018. NSSO conducts large-scale, multi-stage surveys with a representative sample of 1,06,838 households across India out of which the information on access to drinking water is collected from a sample of 34,132 households (National Sample Survey Office, 2013 & 2019).

Variables

The definition and the coding of the variables in this study have been presented in two parts: outcome variables and predictor variables.

Outcome variables

The person who fetches drinking water for the household has been coded into three outcome

variables: (i) male members of the household, (ii) female members of the household and (iii) others. The NSSO codes it by differential age groups such as below 18years, or 18 years or more as well as non-member of the household, hired labour and others. The present study however does not differentiate members on the basis of age and considers only three categories: the males, the females, the non-members of the household (hired labour or otherwise). This was done keeping in mind the primary purpose of the study to analyse gender role in fetching drinking water for the household.

Predictor variables

The choice of the predictor variables was made post careful consideration and an extensive review of literature on factors associated with accessibility and usage of drinking water within the household. For the purpose of this study, the respondents' socio-demographic profile and the factors regarding availability of water were considered including place of residence (rural or urban), the household consumption expenditure, the religion practiced, social group, household size, access to principal sources of drinking water and distance from it.

Four social groups have been recognized. Scheduled Castes (SCs), Scheduled Tribes (STs), Other Backward Classes (OBCs), and 'Other' are the categories representing varying levels of socio-economic deprivation and marginalization. The variable for religion has been grouped into four: Hindu, Muslim, Christian and Others. Household size has been classified into five types: less than 2 and 3, 4, 5 and more than 6-member households. Household consumption expenditure has been divided into four quartiles with the scale ranging from the poorest to the richest.

Statistical Analysis

Statistical analyses in the study have been carried out using STATA 16 (Stata Corp LP, College Station, Texas, USA). Univariate, bivariate cross-tabulation and Multinomial Logistic Regression (MLR) techniques were used to estimate the association between the predictor and the outcome variables. The sample distribution table shows the share of different sub-groups within the total sample. The confidence interval (indicated by the values in parenthesis) shows the range in which the population of that particular parameter lies. MLR is used when the dependent variable in inquiry is nominal (unvaryingly categorical, meaning that it falls into any one of a set of categories that cannot be ordered in any meaningful way) and for which there are more than two categories (Goli et.al., 2020). In this case the dependent variable is categorised into three types: (P₁) male members, (P₂) female members and (P₃) other members fetching drinking water for the household. The mathematical proof of the MLR model has been explained below.

$$Z_1 = \text{Log} \left(\frac{P_1}{P_3} \right) = a_1 + \sum_{1j}^b \times X_j$$

$$Z_2 = \text{Log} \left(\frac{P_2}{P_3} \right) = a_2 + \sum_{2j}^b \times X_j$$

And, $P_1 + P_2 + P_3 = 1$

Where,

-a_{ij} = 1,2: Constants

-b_{ij} = 1,2; j = 1,2 n: Multinomial regression coefficients

-P₁ = Estimated probability of male members of the household fetching drinking water among households in the study area.

-P₂ = Estimated probability of female members of the household fetching drinking water among households in the study area.

-P₃ = Estimated probability of others fetching drinking water among households in the study area (considered as the reference category).

Results and discussion

Access to safe drinking water as a right is critical to fight against poverty, death and disease (CDC, 2017; WHO 2019; Ritchie & Roser, 2019). On the basis of relevant literature and analysis of the available data, the study has some important findings.

Table 7 shows that around two-third of the households are drawn from the rural areas, while the remaining are from urban locations. Hindus form the majority (79%). Muslims, Christians and other religious groups collectively constitute the remaining one fifth of the total sample. The most marginalised SC and ST population make up 44 percent of the sample; the OBC 37 percent and the others 19 percent. About 36 percent constitute the poorer sections while the middle and richer households constitute 30 and 23 percent respectively. The richest quartile constitutes only 11.8 percent of the sample households. Nuclear families are far more numerous. About two-third of the sample households have five or less members each. Around 35 percent of household have 3 or less members and a quarter of the households contain 4 members each. About two-third of the sample households have female members in exclusive charge of fetching water.

Women's responsibility in fetching drinking water for domestic use varies extensively across different geographical locations. In 549 out of a total of 640 districts (86% districts), over 50 percent women

regularly fetch water for domestic use. This includes 60 percent of all districts where more than 75 percent women are engaged in fetching water for domestic needs (Figure 1). This fact only confirms the continued gender-based division that assigns higher burden of managing and collecting drinking water to women as part of domestic chores. The pervasiveness of this gendered work pattern is borne out from the fact that there is little regional variation in the same. Figure 1 reveals that more women are engaged in collecting drinking water in large number of districts located in Madhya Pradesh, Gujarat, Rajasthan, Chhattisgarh, Odisha, Tamil Nadu and North-Eastern states. Since, majority of the drinking water sources in these states are located outside the household, these results in enormous burden for women tasked with this responsibility (NSSO 2018). Interestingly, in Andhra Pradesh (also parts of Telangana), Karnataka and Kerala, the share of women fetching water is relatively less compared to the rest of the country. Studies carried out in these parts of the country have documented that these regions suffer from acute water scarcity where public sources of water are few forcing many households to rely on private wells for accessing water (Kumar 2007; Lazarus 2015; Maruthi & Busenna 2015; Satyam 2017). However, the ownership and distribution of such wells are skewed and it has been seen that for women belonging to SC households (especially *dalit* women) there are significant barriers in accessing water from the few public wells. While the burden of fetching water reduces overall, the lack of public sources in these regions make *dalit* and tribal women more vulnerable. Most such sources are owned and regulated by non-*dalit* households and are therefore sites of discrimination with instances of caste and

gender-based violence (Joshi 2011; Lazarus, 2015; Sobashri & Sanjeevayya 2017). Studies carried out in Andhra Pradesh have reported that in certain villages women have to travel up to 2 kms to fetch water from an open well outside the village, since they were restricted by the 'upper castes' to take water from the local wells or public hand pumps (Dutta et al. 2015). In the case of Kerala, studies have revealed that men at times share the burden with women particularly during times of water stress thereby causing a reduction in women's share (Ahlqvist & Sandberg 2013).

The MLR statistic shows various socio-economic factors associated with the access to drinking water within the households (Table 8). As far as the location is concerned, the odds of female members fetching drinking water for the rural household is double than that of urban households ($p < 0.01$). Prior studies have shown that rural households spend almost fifteen hours a month to fetch drinking water (Kanmony, 2003; Chandran, 2018; Kapil, 2019; Jain & Anand, 2020).

From the empirical analysis, social group, religion and household consumption expenditure emerge as the key correlates in determining the water fetching behaviour of the household. Comparisons show that women's responsibility in fetching drinking water vary significantly on the basis of their socio-economic background and demographic conditions of the households they belong to.

Across social groups SC females have higher odds of fetching drinking water (OR=2.02, $p < 0.01$) than households belonging to STs or OBCs. Public water sources which are easily accessible are often made exclusive to certain privileged social groups depriving the others (Krishnaraj 2011). The data from 2001 Census show that

Table 7: Socio-economic and demographic characteristics of persons fetching drinking water, 2018

Variables	Percentage	Sample Size
<i>Outcome Variables</i>		
Who fetches drinking water		
Male	23.8 [23.3, 24.2]	8,119
Female	71.1 [70.6, 71.6]	24,264
Others	5.1 [4.9, 5.4]	1,749
<i>Explanatory variables</i>		
Social Group		
SC	22.7 [22.2, 23.1]	7,743
ST	21.3 [20.8, 21.7]	7,260
OBC	37.0 [36.5, 37.5]	12,634
Others	19.0 [18.6, 19.4]	6,495
<i>Religion</i>		
Hindu	79.4 [79.0, 79.8]	27,107
Muslim	10.1 [9.8, 10.4]	3,440
Christian	7.6 [7.3, 7.8]	2,581
Others	2.9 [2.8, 3.1]	1,004
<i>Place of Residence</i>		
Rural	76.3 [75.8, 76.7]	26,040
Urban	23.7 [23.3, 24.2]	8,092
<i>Household Size</i>		
1 & 2 member	18.4 [18.0, 18.8]	6,284
3 members	15.8 [15.4, 16.2]	5,389
4 members	25.1 [24.6, 25.5]	8,555
5 members	18.3 [17.9, 18.7]	6,249
6 and above members	22.4 [22.0, 22.9]	7,655
<i>Household Consumption expenditure</i>		
Poor	35.7 [35.2, 36.2]	12,187
Middle	29.3 [28.8, 29.8]	9,996
Richer	23.2 [22.8, 23.7]	7,928
Richest	11.8 [11.4, 12.1]	4,021

Notes: 1. the confidence intervals are indicated in the parenthesis.

2. The percent values indicate the share of different subgroups out of total sample

Source: NSSO, 76th round, 2018

dalit households continue to have reduced access to water and also travel significantly longer to fetch drinking water (Tiwari, 2006).

MLR estimates show women from Muslim households have the highest odds of fetching drinking water than their counterparts from among other faiths. Muslim women

(especially in areas where they constitute the minority) are often debarred from accessing public wells and tap both in rural and urban areas. In addition, most policy decisions involving water accessibility often fail to cover Muslim neighbourhoods (Contactor, 2012).

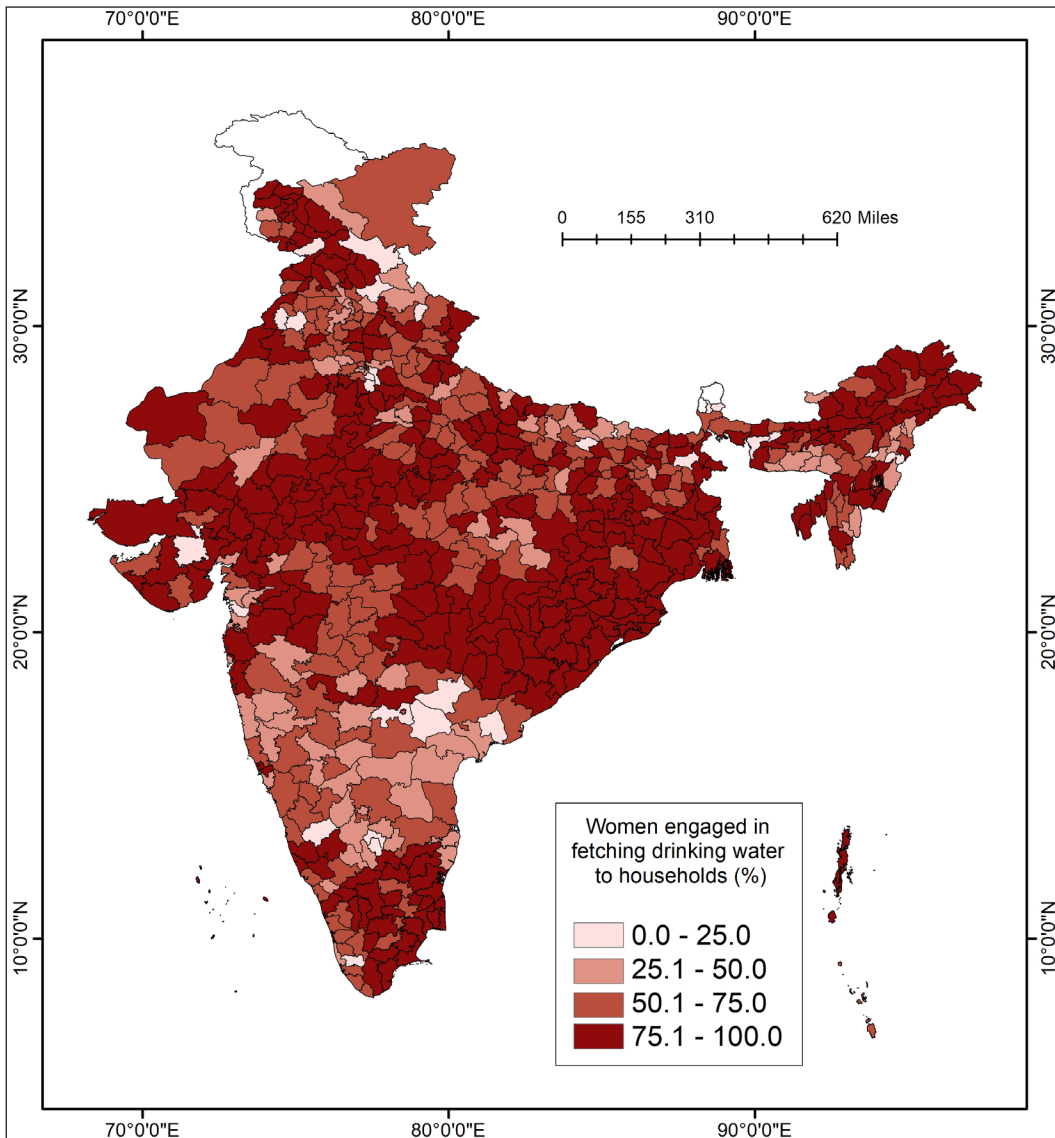


Fig. 1: Inter-district variation in the share of women fetching drinking water, NSSO (2018)

Across economic categories, the odds are always against women from the poorer sections of the society. Studies confirm that rural households with large landholdings command greater power and autonomy to control the flow and access to water resources across all communities (Sultana, 2009; Neimanis, 2013; Naz 2016; The World Bank 2016). While women in wealthier household's face restrictions to their mobility and enjoy far less autonomy, better access to a water source such as a tube well may place them at an advantage (Sultana, 2009). Poor households generally depend on surface water sources such as ponds, streams and wells which are all outside the household premise and located at a considerable distance (Kanmony, 2003). Poor women have to bear the brunt of double burden; first in terms of less access to resources and second due to the low status accorded to women's work, knowledge and responsibilities. These intersections of poverty along with the low status of women may lead to an amplification of health risks in such households (Crow & Sultana, 2002).

In terms of household size, the odds of females fetching drinking water in three-member households is the highest (OR=1.4, $p<0.01$) compared to single or double member households where the odds of females fetching drinking water is the lowest (OR=0.56, $p<0.01$). In smaller households with 1 or 2 members, women have relatively less burden of fetching water since the overall water usage is less. In larger households, as in joint families, the power relations within the households are generally inclined in favour of the patriarch (oldest brother/ father) or the senior matriarch (mother/ grandmother/ eldest daughter-in-law). They in turn are able to

command over the younger female members (most likely the daughter-in law) when it comes to fetching water for the household (Sultana, 2009). In households with more than three members where women members fail to cater to the needs to the water needs of the household, children/younger members may be used to share the burden.

Policy formulation on access to water needs to be informed by drawing onto the rich tradition of informal practices, economics and micropolitics of everyday life put forth by women (Rocheleau 1996; Nagar 2002; Cameron and Gibson-Graham, 2003; Goldman, 2007). Socio-economic and locational variations discussed in the study helps in highlighting the problem areas (districts). Fast changing household demography or even the transition from a joint family to a nuclear family hardly improves the situation for women in India. In some areas, a major part of the day is devoted by women to fetching water which could be otherwise used for gainful activities. Lack of access to safe drinking water not only causes health related complications for women but for the entire household in general. Therefore, discourses on access to safe drinking water must incorporate a gendered perspective from initial stage of development interventions to better informed policymaking (Cleaver & Elson, 1995).

Despite a nuanced assessment on the issue concerning access to drinking water based on a nation-wide large sample, this study however was unable to address important issues pertaining to topographical, environmental and climatic factors which influence gender relations in access to water in varying geographical conditions largely due to data constraints.

Table 8: Association between who fetches drinking water with defining factors

Variables	Male			Female		
	OR	[95% CI]		OR	[95% CI]	
<i>Social group</i>	1.29**	1.07	1.56	2.02**	1.69	2.43
SC	1.44**	1.21	1.71	1.87**	1.58	2.21
ST	0.98	0.86	1.12	1.11	0.98	1.26
OBC	1.00			1.00		
Others ^b						
<i>Religion</i>	2.03**	1.60	2.57	3.18**	2.54	4.00
Hindu	3.01**	2.24	4.04	5.05**	3.80	6.71
Muslim	1.10	0.83	1.45	0.88	0.67	1.15
Christian	1.00			1.00		
Others ^b						
<i>Place of residence</i>	1.76**	1.56	1.99	2.77**	2.47	3.11
Rural	1.00			1.00		
Urban ^b						
<i>Household Size</i>	0.63**	0.53	0.74	0.56**	0.48	0.66
1 & 2 member	1.16	0.96	1.41	1.43**	1.19	1.72
3 members	1.18	0.99	1.40	1.39**	1.17	1.64
4 members	1.12	0.93	1.35	1.2*	1.00	1.44
5 members	1.00			1.00		
6 and above members ^b						
<i>Household consumer expenditure</i>						
Poor	1.71**	1.41	2.07	5.18**	4.30	6.23
Middle	1.16	0.99	1.37	2.97**	2.53	3.48
Richer	1.11	0.96	1.28	1.9**	1.65	2.19
Richest ^b	1.00			1.00		
Constant	1.43	1.07	1.90	0.73	0.55	0.97

Number of Observations: 34132

LR chi2(28) = 3385.63

Prob > chi2 = 0

Pseudo R2 = 0.0673

Log likelihood = -23442.797

Notes: OR = Odds ratio; CI = confidence interval *p < 0.05, **p < 0.01; ^b = Reference category

Source: NSSO, 76th round, 2018

Conclusion

The paper deliberated upon the role of women with regard to collection of water for domestic use and the socio-economic determinants of the same. The analysis points out that women overwhelmingly bear the burden of procuring drinking water for the household. However, in a heterogeneous society like India, one must avoid the mistake of generalising women as a homogeneous category. Evidence from this study suggests women belonging to different socio-economic groups command different degrees of autonomy in accessing and utilising the resource. Women from households belonging to poorer less privileged and from minorities bear the brunt when it comes to fetching water for domestic use and hence invest more time and energy in collecting drinking water. The problem is even more serious for women from households who have to collect water from far off distances. Institutional interventions, both public and private, are crucial in determining the access to safe drinking water sources. It is invariably true that women from SC/ST communities suffer more.

It is therefore essential to ensure the inclusion of women in development strategies and interventions as enshrined in the National Water Policy (2002). Despite safe water for drinking and sanitation being considered as a pre-emptive need, policy practices prioritising domestic water usage over industrial and agricultural needs is limited (NWP 2012). Private sector participation (PSPs) needs to be monitored and closely regulated since it leads to differential access and further marginalization of disadvantaged sections in their access to safe drinking water. Community owned wells, hand pumps wherein everybody has equal rights over water

needs to be encouraged especially in areas where access to water is determined by social hierarchies of the bearer. Further studies need to focus on the geographical specificities of water such as climate, topography and micro-regional and social interactions which may be beneficial in chalking out superior strategies. Identifying differential access with the help of a micro-level mapping of access to water is critical for targeted interventions and regular monitoring of the progress made in universal access to drinking water.

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