

# Prevalence of Gastro Intestinal symptoms and its determinants among rural population of Kancheepuram district, Tamil Nadu, India

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## Abstract

**Background:** Water is the most common yet the most precious resource on earth without which there would be no life on earth. The most predominant water borne disease is diarrhoea of which 88% is attributed to unsafe water supply, inadequate sanitation and hygiene. Diarrhoea causes 4% of deaths worldwide. **Objective:** To measure the prevalence of Gastro Intestinal (GI) problems and its determinants in rural area of Kancheepuram district, Tamil Nadu. **Materials and methods:** A community based cross sectional study was conducted in the rural area of Chunampet, Kancheepuram district. The study area includes ten villages, out of which 2 villages were selected. The study was conducted on January 2014. Sample size was calculated as 1200. Data was collected using questionnaire containing details on **socio demographic profile**, drinking water, and details of family members with Gastro intestinal symptoms. **Results & Conclusion:** During the last 3 months, 11.8% (58) of the houses had GI problems. 55.7% households use pipe water for drinking purpose, 64.4% household members don't consume chlorinated water, 59.3% household members don't consume boiled water and 68.7% households don't have proper latrine facility. The study showed that the reported GI problems were high among the houses who consume water which is neither boiled nor chlorinated and don't wash their hands before eating, which were the most likely risk factors for acquiring GI illness.

**Keywords:** Gastro Intestinal (GI) Problems, water, rural area, diarrhoea.

## Introduction

Water is the most common yet the most precious resource on earth without which there would be no life on earth<sup>(1)</sup>. The quality of drinking water refers to physical, chemical and biological characteristics, which is a powerful environmental determinant of health. Though water is essential for life, it can and does transmit many communicable diseases including some vector borne diseases. The good water quality can also prevent and reduce mortality due to water borne diseases<sup>(2)</sup>.

The most predominant water borne disease is diarrhoea of which 88% is attributed to unsafe water supply, inadequate sanitation and hygiene. Diarrhoea causes 4% of deaths

worldwide<sup>(3)</sup>. It results in 2.2 million deaths in which mostly children under 5 years are affected especially in developing countries<sup>(4)</sup>. In developing countries, over 3,86,000 deaths occur annually due to diarrheal disease with India topping the list<sup>(5)</sup>. The World Bank also estimates 21% of communicable diseases in India are water related. In 1999, an estimated 7,00,000 deaths due to diarrhoea alone occurred in India with an average of 1,600 deaths per day. The highest mortality from diarrhoea is in children under the age of five, highlighting an urgent need for focused interventions to prevent diarrhoea disease in this age group<sup>(6)</sup>.

The predominant water related bacterial infections in India are Cholera and Typhoid. A total of 68 outbreaks occurred in 18 states and union territories and the overall

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number of cases was 2,22,038 and 823 deaths and overall case fatality rate was 0.37% over the 1997-2006 years. The states of Orissa, West Bengal, Andaman and Nicobar Islands, Assam and Chhattisgarh accounted for 91% of all outbreak related cases<sup>(7)</sup>. The incidence of typhoid cases common among age group 5-14 years. 151 cases were reported per 10,000 population and 50 deaths were reported<sup>(8)</sup>. More number of cases are reported in West Bengal India<sup>(9)</sup>. Thus, the study is planned to measure the prevalence of Gastro Intestinal (GI) problems and its determinants in rural area of Kancheepuram district, Tamil Nadu.

#### Materials and methods:

A community based cross sectional study was conducted in the rural area of Chunampet, Kancheepuram district. The study area includes ten villages, out of which 2 villages Villipakkam and Puthirankottai were selected by simple random sampling method (lottery method). All the households in the selected villages were included in the study; repeated visits were made to include the houses that are closed during initial visits. Households and participants who could not be interviewed even after three visits were

**Table 1: Socio demographic distribution among the study population (N=492)**

	Frequency(n)	Percentage (%)
<b>Socio economic status</b>		
Class I	98	19.9
Class II	244	49.6
Class III	90	18.3
Class IV	52	10.6
Class V	8	1.6
<b>Education of the head of the family</b>		
Illiterate	156	31.7
Primary	56	11.4
Middle	114	23.2
High school	122	24.8
Higher secondary	18	3.7
Graduate and above	26	5.3
<b>Occupation of the head of the family</b>		
Professional	20	4.1
Semi-Professional	15	3.0
Clerical, Shop keeper, Farmer	239	48.6
Skilled workers	100	20.3
Semi-skilled workers	32	6.5
Unskilled workers	18	3.7
Unemployed	68	13.8
<b>Type of House</b>		
Kutcha	241	49
Semi-Pucca	98	19.9
Pucca	153	31.1
<b>Source of drinking water used</b>		
Pipe water	274	55.7
Hand pump	93	18.9
Bore well	33	6.7
Dug well	11	2.2
Others	27	5.5
Pipe water & hand pump	3	0.6
Hand pump & bore water	1	0.2
Hand pump & others	1	0.2
Bore water & others	49	10
<b>Availability of toilet facility</b>		
Yes	154	31.3
No	338	68.7
<b>Total</b>	<b>492</b>	<b>100</b>

\*Others- packaged water, commercially available purified water

excluded from the study. The data were collected during 6th January 2014– 1<sup>st</sup> February 2014).

Sample size was calculated as 1200 by using the incidence of diarrhoea as 25%,<sup>(10)</sup> assuming 95% significance and 10% relative precision, using the formula  $Z^2PQ/d^2$ . Data was collected from the permanent residents of both the villages.

House to house survey was conducted by the undergraduate students (VI semester) using the questionnaire, supervised by the interns, PG's and faculties to ensure the quality of data collected. Students were trained to interview by the investigators prior to data collection. A structured pre tested questionnaire was used to collect the required information

**Table2: Distribution of GI symptoms among the households (N=492)**

	Households affected by GI problems in the past three months		Total N (%)	p value
	Yes N (%)	No N (%)		
<b>Overcrowding</b>				
Yes	22(37.9)	208(47.9)	230(46.7)	0.152
No	36(62.1)	226(52.1)	262(53.3)	
<b>Socio-economic status</b>				
Class 1	11(19.0)	87(20.0)	98(19.9)	0.775
Class 2	28(48.3)	216(49.8)	244(49.6)	
Class 3	11(19.0)	79(18.2)	90(18.3)	
Class 4	8(13.8)	44(10.1)	52(10.6)	
Class 5	0(0.0)	8(1.8)	8(1.6)	
<b>Type of house</b>				
Kutchha	32(55.2)	209(48.2)	241(49.0)	0.459
Semi-pucca	12(20.7)	86(19.8)	98(19.9)	
Pucca	14(24.1)	139(32.0)	153(31.1)	
<b>Method of solid waste disposal</b>				
Throwing in open	41(70.7)	297(68.4)	338(68.7)	0.348
Open pits	13(22.4)	92(21.2)	105(21.3)	
Closed pits	2(3.4)	6(1.4)	8(1.6)	
Others	2(3.4)	39(9.0)	41(8.3)	
<b>Toilet facility in houses</b>				
Yes	11(18.47)	143(32.95)	154(31.3)	0.031
No	47(81.03)	291(67.05)	338(68.7)	
<b>Drinking water source used</b>				
Bore well	4(6.9)	46(10.6)	50(10.2)	0.042
Hand pump	15(25.9)	65(15.0)	80(16.3)	
Pipe water	33(56.9)	259(59.7)	292(59.3)	
Dug well	3(5.2)	32(7.4)	35(7.1)	
Others	2(3.4)	15(3.5)	17(3.5)	
Bore well & Hand pump	0(0.0)	1(0.2)	1(0.2)	
Bore well & Pipe water	1(1.7)	0(0.0)	1(0.2)	
Hand pump & Pipe water	0(0.0)	16(3.7)	16(3.3)	
water				
<b>Boiling water before drinking</b>				
Yes	20(34.48)	210(48.39)	230(46.75)	0.046
No	38(65.52)	224(51.61)	262(53.25)	
<b>Consumption of chlorinated water</b>				
Yes	11(18.97)	164(37.79)	175(35.57)	0.004
No	47(81.03)	270(62.21)	317(64.43)	
<b>Washing hands before eating</b>				
Yes	28(48.26)	429(98.85)	457(92.9)	0.000
No	30(51.72)	5(1.15)	35(7.11)	
<b>Total</b>	<b>58(100)</b>	<b>434(100)</b>	<b>492(100)</b>	

\*Fisher's exact test applied

(study variables). The questionnaire contains details on Socio demographic profile, Sources of drinking water, Details of drinking water, Details of family members with Gastro intestinal symptoms. The questionnaire was designed to suite the local population and was pretested. Students introduced themselves to the family members and explained them the purpose of the study. The interview was conducted after obtaining written consent from the study participants. All the information that was obtained from the family members was immediately filled in the questionnaire. The filled questionnaires were checked and signed by the interns, post graduates and faculties on the same day. Institutional research and ethical committee clearances were obtained prior the commencement of the study. The data were analysed by SPSS (Statistical Package for Social Science) 22.0 version. P-value less than 0.05 were considered as statistically significant. Descriptive statistics: Mean, Standard deviation and Proportions was calculated. For association, Chi square test was performed.

### Results

In our study, we surveyed two villages namely, Villipakkam and Puthirankottai comprising 212 and 248 households respectively. So, a total of 492 houses were interviewed for a total of 1517 individuals. In this study population, 52.5% are females and 47.5% are males. In this study population, 52.5% are females and 47.5% are males. Around 49.6% (244) households belong to Class 2 Socio-economic status and least number of participants belonging to class 5 (1.6%) according to modified BG Prasad classification (2014). 31.7% (156) of the head of the family were illiterate followed by 24.8% (122) of the participant having education up to high school. Regarding the occupation of the head of the family among the study population about 48.6% (239) were clerical/shop owners/farmers and 3% (15) of the people are employed in semi professional works. (Table 1)

Among the surveyed households, 49% (241) houses were kutcha house followed by the puccha houses (31.1%) and Pipe water (55.7%) was used as the main source of drinking water among the study households followed by hand pump (18.9%). Most of the houses (68.7%) don't have proper toilet facility. (Table 1)

During the last 3 months, 11.8% (58) of the houses had GI problems, among which 37.9% (22) of the houses affected by GI problems had overcrowding. Nearly half of the affected houses (48.3%) belong to class 2 socioeconomic status and more the half of the affected houses (55.2%) are kutcha houses. Majority of the houses affected by GI problem throw their domestic waste in open land near their home (70.7%) and don't have proper toilet facility (81.03%). Around 56.9% of the affected houses use pipe water for drinking purpose. Most of the affected houses does not boil their water before drinking (65.5%) and consume non chlorinated water (81%). About fifty percent of the affected households don't wash their hands before eating. (Table.2)

### Discussion:

In our study, among 492 households, 58 household members had GI problems in the past three months which contributes to 11.8% of the study population. In our study, 64.4% household members don't consume chlorinated water, which is most likely to cause GI problems. Sathe PV et al conducted a study which shows that 9,000 individuals among a population of 1,35,000 individuals had GI problems due to consumption of non-chlorinated water.

A study conducted by Jacqueline Firth et al in rural South India concluded that chlorine in drinking water inactivates the bacteria and some viruses that cause water borne diseases, protects it from recontamination during storage in houses. This study emphasizes the importance of chlorination of water. In our study 51.72% of household members don't wash their hand before eating which is a risk factor for acquiring GI illness. A study conducted by Lee M et al showed that 83% of individuals have GI illness as they do not wash their hands before eating<sup>(11)</sup>.

In our study, 65.52% household members don't consume boiled water which is most likely to cause water borne disease. A study conducted by Boisson et al showed that the process of boiling of drinking water can kill almost all the microorganism, even certain viruses, which help in decontamination of water<sup>(12)</sup>. Based on our study, we reason out the risk factors for GI problems as, consuming non chlorinated water without boiling, not washing hands before eating, poor latrine facility and disposing waste in open space. This fact correlates with the study conducted by James Greenwell et al which concludes that GI diseases is preventable through use of safe water; adequate sanitation and most sustainable of all, simple hygienic behaviour such as hand washing with soap<sup>(13)</sup>. In our study 55.7% households uses pipe water for drinking purpose and we compare this with the study conducted by M. Hussein Gasem et al, which shows similar results<sup>(14)</sup>. In our study, 51.7% of the individuals affected with GI problems don't wash their hand before eating, similar result was seen with a study conducted by Vollaard AM et al.<sup>(15)</sup>

### Conclusion:

The study showed that the reported GI problems were high among the houses who consume water which is neither boiled nor chlorinated and don't wash their hands before eating, which were the most likely risk factors for having GI illness. Awareness regarding the safe drinking water and necessary for hand washing before eating should be given to the village people to improve the condition.

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