

People Perceptions on Implementation of Water Meters in Municipal Water Supply System: A Case Study from Pollachi Town, Tamil Nadu, India

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Abstract

Understanding the perception of people on the provision of water meters in houses can aid in the enhancement of water conservation strategies in a locality. In this study, the perception of the residents of the town of Pollachi, Tamil Nadu, India was assessed using a questionnaire survey. Queries were related to the quality of the water, duration and frequency of water supply, need for water pricing, usage of filters, preference for implementation of water meter, water treatment, etc. The survey was analyzed based on four major parameters, namely; age, gender, locality and literacy of the people. A total of 78 residents from various locations in and around Pollachi were considered for this survey. The study indicates that frequency of supply of water to the residents of the town is not uniform in all locations and the residents within the town received water supply for a longer duration compared to those living away from the town. The quality of water is perceived to be good by majority of the residents. There was a mixed response from the males and females regarding boiling of water and usage of filters. Perception of people over the provision of water meter in the house is mixed and most of the males perceived that a water meter should be provided compared to the females. Women had more conviction of the fact that the provision of a water meter would solve the water shortage problem in their town, in comparison with the men. Thus, provision of water meter will definitely aid in water conservation as people would have to pay as per their usage.

Keywords: Water meter; Perception; Municipal water supply; Water quality; Water demand

1. Introduction

Water scarcity is an issue that is threatening many developing countries today and India is no exception to that. India is the home for 1.34 billion people. With 16% of the global population, it has only 4% of the world's water resources (Government of India, 1999). India has been taking significant steps to develop its water resources, but rapidly growing population,

industrial and infrastructural development, agriculture and unequal distribution of water has resulted in demand exceeding the supply (Cronin *et al.*, 2014). According to National Institute of Hydrology (2010), the current water availability per capita is around 1,170 m³/person-year, indicating that India is just above the water stressed criteria of 1,000 m³/person (WRI, 2007), based on Government of India (1999). In addition, issues such as

erratic distribution of rainfall, floods and droughts, poor waste management laws, poor water quality due to open defecation, illegal extraction of groundwater, inefficient water use and inter-state water disputes have only added to the misery. Improper water management strategies coupled with spatial variation in the water resources have resulted in severe water shortage and led to growth of conflicts between farmers and industrialists (Joy *et al.*, 2011). The situation has further worsened due to climate change and global warming (Campbell-Lendrum and Woodruff, 2007). Efficient water demand management is seriously affected by poor institutional reforms (Kumar, 2010) and poor implementation of the existing laws and provisions (Cronin and Khosla, 2012).

Many states in the Indian subcontinent are plagued with this problem both in terms of quantity as well as quality. Especially during summers, the country faces an acute shortage of safe and sustainable water, and more specifically groundwater. The surface reservoirs are also shrinking due to illegal use of land for infrastructural development. A very good example to illustrate the pathetic status of surface water sources in India is River Ganga, with heavy pollutant load of contaminants like heavy metals from industrial discharges, sewage and open defecation waste, as well as pesticides and other organic pollutants from agricultural fields. If the same scenario continues, there will be exponential depletion of water and within a period of 10-20 years, major towns and cities in the country will be left stranded without water. Thus, water conservation is the need of the hour. Water conservation is the most practical and environment friendly approach to reduce the demand on water. Although water conservation methods may initially require more efforts and funds, but in the long run will save money and resources. Water conservation practices can be begun at home in a simple manner like turning off the water when not being used and using the available water in an efficient manner at home.

Furthermore, this alarming situation can be tackled by adopting various water management methods and strategies such as restoration of groundwater recharge areas,

implementing strong policies for waste disposal, rainwater harvesting, roof top harvesting, restoration of ponds, etc. As the saying goes "A good practice begins at home", one of the measures that can be adopted is installation of water meters in houses. Proper application and operation of water meters can reduce the water losses significantly and aid in overcoming the water shortage issues. Although, this policy would be highly useful and beneficial for any society, the major barriers for the execution of this will be the people themselves. Every person has a different perception on a new policy that is being implemented in the society and this perception varies with age, gender, education, locality and so on.

Many studies have been conducted in the past to understand the perception of the people on various aspects of water resources in the society. Smith *et al.* (1995) conducted a study to examine the human perception of two important visual aspects of the appearance of the river and lake water, clarity and color, from the perspective of bathing and aesthetics in New Zealand. They concluded that the people's perception of visual aspects appears to have a strong influence on their rating of overall site suitability. McDaniels *et al.* (1998) conducted a study on the public judgement regarding the water quality, public attitudes about water conservation and related issues in the lower Fraser Basin of southwest British Columbia, Canada. The results showed that the subject generally perceive water quality in specific water bodies as worse than that indicated in technical studies of those water bodies. Herbst *et al.* (2009) conducted a study in the Mekong delta in the south of Vietnam to understand the people's perception on water, sanitation and health using quantitative and qualitative methods. Yasar *et al.* (2011) investigated the quality of drinking water used by the community and their perception towards water quality. They concluded that the lack of proper water supply system, proper sanitation and drainage facility were the common contributing factors for the poor health of the people. Rojas and Megele (2013) conducted a survey study to understand how the perception of water quality

and health risks by different social target groups can influence the implementation process of drinking water systems. They concluded that the implementation process of drinking water systems must consider the target groups' socio-economic and cultural context forming their perceptions. Sajjadi *et al.* (2016) conducted a survey to understand the perception of consumers on drinking tap water quality and other drinking water sources in Gonabad as a small semiarid city. Their results showed that the demographic variables had a significant relationship with the customer satisfaction.

Several studies have been conducted in various countries in the past for evaluating the consumer's perception on the water quality, aesthetics, water conservation, sanitation and health issues. It is observed from the literature that very few studies have focused on the people's perception on the implementation of a water meter with the objective of water conservation in a locality. In this paper, we have analyzed the various perceptions of the residents of the Pollachi town, located in the state of Tamil Nadu, India on the implementation of the water meter scheme, based on the age, gender, location and literacy of the residents.

2. Study area and Methodology

Pollachi is located at 10.662°N and 77.0065°E with an average elevation of 293 m. The town receives rainfall from the southwest monsoon. According to the 2011 census, the town has a population of 90,180 with a sex-ratio of 1,012 females for every 1,000 males. The town has a total of 24,755 households. The economy of the town is predominantly based on agriculture. The location of the town in the district of Coimbatore in Tamil Nadu is shown in the Figure 1.

The district forms a part of the upland plateau region of Tamil Nadu with many hill ranges, hillocks and undulating topography with a gentle slope towards the east except for the hilly terrain in the west (Dhanalakshmi *et al.*, 2015). The Tamil Nadu water supply and drainage (TWAD), Department of rural development and Panchayat Raj have the responsibility of providing safe drinking water supply for the rural areas in the state.

To analyze the perception of the people on the implementation of the water meter, a questionnaire was prepared based on the demographic information (age, gender,

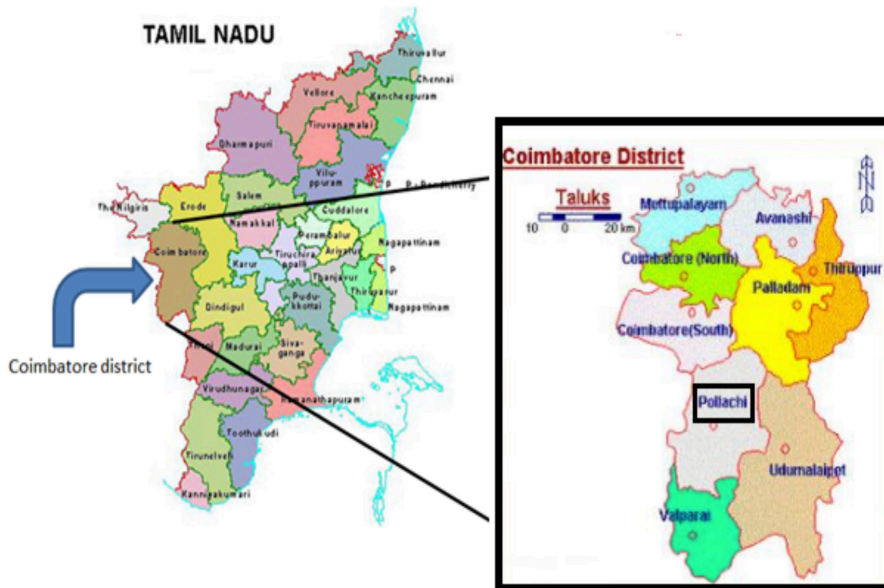


Figure 1. Map of the Pollachi town in the district of Coimbatore, Tamil Nadu

Questionnaire

Name(Optional): _____ Age: _____ Sex: M/F
 Education: _____ Location: _____

1. How much water tax do you pay per year?
 1000 -
2. How many times do you receive water from the municipality in a week?
 2 times
3. How many hours of water supply do you get?
 10 hours
4. What is the quality of water (Good / Bad)?
 Good
5. Do you boil the water before drinking? (Yes / No)
 Yes
6. Do you use any filters for filtering the water before drinking? (Yes/No)
 Yes
7. Are you happy if a water meter is fitted in your house? (Yes/No)
 Yes
8. Will fitting of water meter decrease/increase the house tax?
 Increase
9. Will fitting of water meter solve the water shortage problem?
 Yes
10. Have you ever get sick by drinking this water?
 No
11. Does the water contain high chlorine content?
 Sometimes
12. How many members are staying in your house?
 4 members
13. How much quantity of water do you collect generally?
 500 L
14. Are you happy with the pressure with which water is supplied?
 OK
15. Any suggestions for improvement.
 No

Figure 2. Sample questionnaire

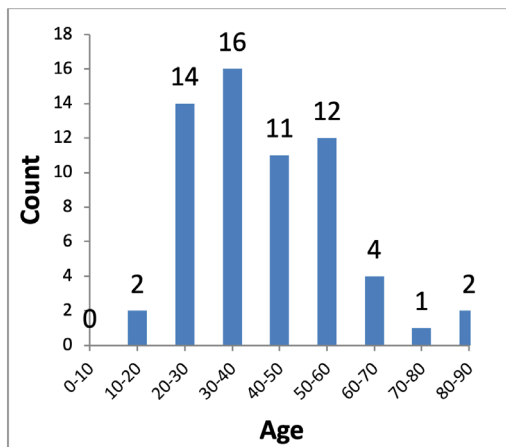


Figure 3. Histogram of the age distribution of the people surveyed

literacy level, location). The questionnaire was distributed to 78 people living in different localities in and around the Pollachi town, namely, Srinivasapuram, Zaminuthukuli, NG Pudur, Ranga Samthur, Sethumadai, Awalchinnampalayam, Karuppumpalayam, Negamam, Unjavalempatti, Nallur and Kunjipalayam. The questionnaire consisted of 15 questions related to enquiries regarding the water tax, quantity and quality of water, health, water treatment, and water meter. The questionnaire was framed in such a way to obtain information regarding the duration and frequency of the municipal water supply, treatment of the collected water by boiling, filtering of the water, sanity and health due to consumption of the municipal water.

Furthermore, many queries regarding the implementation of the water meter were also posed to the participants of the questionnaire survey. A sample of the questionnaire developed for this study has been provided in Figure 2.

In this study, the perception of the people of the Pollachi town on the implementation of a water meter system was analyzed using questionnaire survey. The major parameters based on which the study was conducted are age, gender, location and literacy. The histogram showing the age distribution of the people who were surveyed in this study is shown in Figure 3.

Figure 3 shows that there were no participants below the age of 10 and also within the age group of 10-20, only 2 were surveyed.

The majority of the participants fall in the age group of 30-40 with 16 participants. The total number of participants in the histogram adds up to 62 only although 78 of them were surveyed. This is because some of the participants refused to indicate their age in the questionnaires.

The gender distribution of the people who were surveyed is shown in Figure 4.

Figure 4 shows that the majority of the people surveyed in this study are men. Among the participants, 69.23% of them were men and 30.77% of them were female. The distribution of people from various localities is shown in Figure 5.

It is observed from Figure 5 that the most of the participants surveyed were from Zaminuthukuli and Pollachi town. The third highest was from Srinivasapuram. Only a couple of people participated from the remaining localities. The level of literacy of the participants is shown in Figure 6.

Majority of the people did not disclose their educational background which is evident from Figure 6 (60.25%). Among the remaining, 11.54% were post-graduates, 15.38% were graduates, 5.13% were diploma, and 7.69% had completed only schooling.

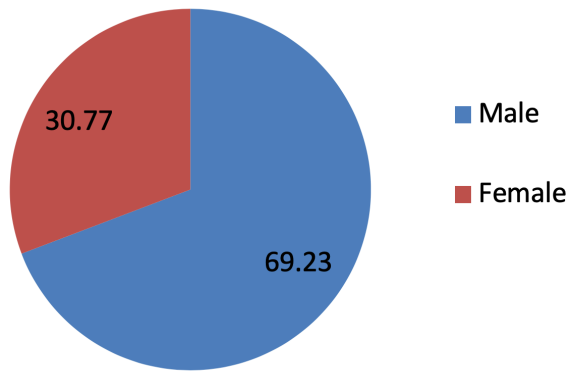


Figure 4. Gender distribution of the participants

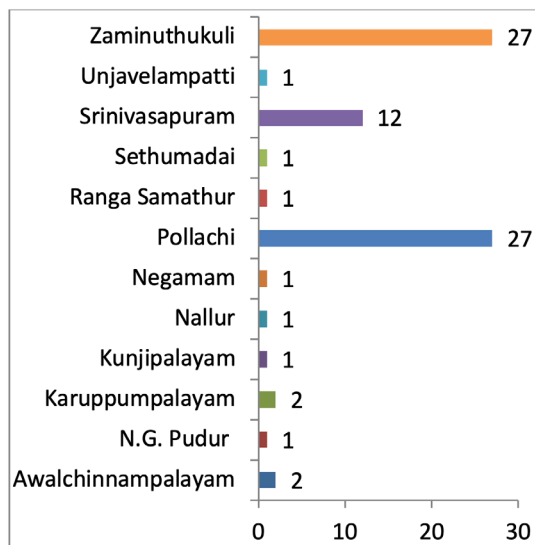


Figure 5. Distribution of people from various localities

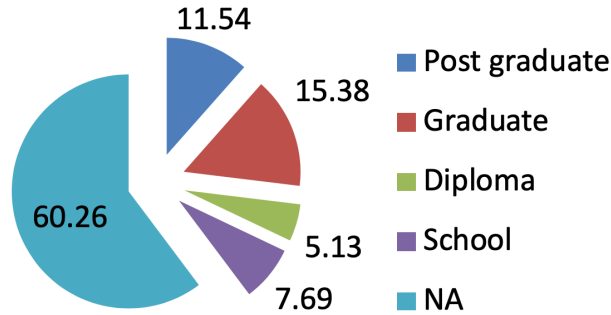


Figure 6. Level of literacy of the participants

3. Results and discussion

The perception of the people of the Pollachi town on the implementation of a water meter system was analyzed using a questionnaire survey. Age, gender, location and literacy were considered as the major parameters based on which the study was conducted.

3.1 House tax

The questionnaires collected from the people were analyzed. It was observed that most of the people paid a water tax of rupees 1,200/year. The minimum yearly water tax amount was 300 rupees. Such a low amount was paid by some of the residents since they were sharing the water supplied by the municipality with others. The maximum yearly water tax amount was found to be 3,000 rupees since they had more than one water supply connection in their houses.

3.2 Frequency of water supply

Based on the analysis, it was observed that Pollachi town received water supply atleast once from the municipality and in some cases, residents received water even twice or thrice in a week.

Zaminuthukuli and Srinivasapuram received water thrice in a week. Some residents in Zaminuthukuli received water even four times in a week indicating that Zaminuthukuli was never deprived of water supply any time in the year. Only Nallur received water daily from the municipality sources. During the summer season, frequency of supply was reduced and

most of the residents received water only once a week. This also shows that water shortage is a common occurrence in the summer seasons even in well-resourced regions.

3.3 Hours of supply

The water was supplied for different durations in various parts of the town. The maximum duration was 3 h and the minimum was 45 min. The maximum duration of 3 h supply was observed in Zaminuthukuli. Pollachi town residents were supplied water for either 1 h or 2 h. Some of the residents in Zaminuthukuli received water for 45 min and also 1.5 h during each supply. Such a variation in the water supply is due to variation in the water demand of the residents in different localities. A particular resident in Pollachi mentioned that they receive water only for 10 min duration which was least indicated in the survey. The reason for this could be that the resident was located in the outskirts of the Pollachi town. We can infer that the duration of supply of municipal water reduces as we move from the inner zone to the outer zones of the Pollachi town.

3.4 Quality of water

The quality of water was perceived to be good by majority of the residents in various parts of the town (Figure 7).

It was perceived to be normal by some people and also as bad by a few residents. It was observed from the survey that aged people perceive the quality of water to be normal or bad compared to the younger generation. The reason could be that the aged people have a

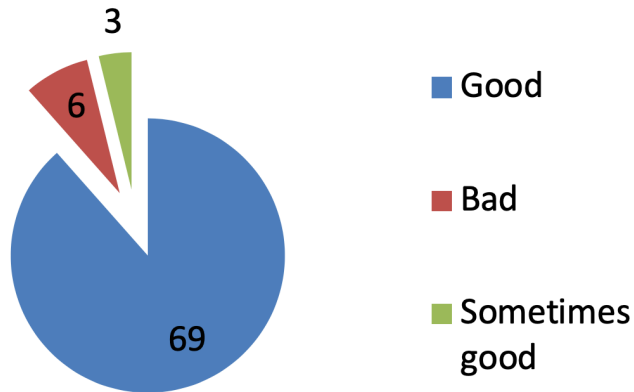


Figure 7. People's perception on the quality of water

significant resident history compared to the youngsters. They have been observing the water quality over many years due to which their perception is much better compared to others. Another interesting observation is that those who have mentioned the water quality to be bad or sometimes good have not revealed their educational status. Therefore, those who are well educated have felt that the quality of water to be good. Some of the residents have also mentioned that the water quality is sometimes good and sometimes perceived to be bad. This could be due to the effect of monsoons. When the rivers around the town receive rain water, the quality of water may get degraded by deposition of sediments. It is also observed that all the females perceive the quality of water to be good while the males possess a mixed response for the same.

3.5 Boiling and use of filters

Among 78 residents, 30 of them indicated that they boil the water before consumption while the remaining do not boil the water. Among those who do not boil the water (48 residents), 15 of them make use of filter to purify the water, while the rest do not use any filter. It was observed that among those who do not boil the water, many of them were educated. Although 50% of the educated class was observed to avoid boiling, the remaining 50% of them boiled the water. This indicates that in the educated group, some perceive the need for boiling while others perceive that the

quality of water is good enough to drink without boiling. As per the age group, we have received a mixed response towards the need for boiling the water. In our survey, 19 residents are above the age of 50 and 10 among them do not boil the water. This shows that people who are aged have a higher immunity and thus do not feel the requirement for boiling the water. In relation with the boiling of water and use of filters, 73 residents have mentioned that they usually don't get sick by drinking this water. This also indicates that the water quality is predominantly good. There is a mixed response from both males and females as far as boiling of water and usage of filters is concerned in this study.

3.6 Treatment of water

When enquired about the treatment of water with chlorine, 18 of them indicated that concentration of chlorine being added to the water was high, 38 felt that the chlorine content was normal in the supplied water, 21 residents felt that sometimes the chlorine content was high while low at some other times. The chlorine content was found to high in Srinivasapuram and Pollachi. The concentration was also found to be normal in the Zaminuthukuli and in some of the households of Pollachi and Srinivasapuram. Among 78 residents, 56 of them felt that water was treated which also provides evidence for the fact that the quality of water is good in most of the locations that were surveyed.

3.7 Water meter provision

The survey indicates that 62 of the residents from various locations in and around Pollachi are happy to have a water meter fixed in their houses, and 15 of them are not satisfied with the provision of the water meter. The residents also perceive that providing a water meter can increase the water tax as 36 of them felt in that manner. An approximately equal number (29 residents) felt that the provision of water meter will decrease the water tax to be paid to the municipality and 12 residents did not answer to this query. We can infer from this survey that the perception of the people over provision of the water meter is mixed. Some people feel that provision of water meter will lead to reduction in the consumption of water which will result in reduction of water tax while some perceive otherwise.

Majority of the residents (40 of them) felt that provision of a water meter will solve the water shortage problem prevailing in the town but 29 of them felt the other way. Based on

educational qualification of the people (Figure 8), it can be observed that 66.67% of the post graduates, 58.33% of the graduates, 50% of the diploma holders and 33.33% of those with school level education have expressed that the provision of the water meter will enable in tackling the water shortage issues in the town. It is obvious from the figure 8 that the educated classes of people understand the importance of provision of water meters in the houses.

Based on gender, 62.5% of the females are happy to have the provision of a water meter while the remaining is against it. Similar response was observed to query as to whether the provision of water meter will increase the water tax payment. Among those who perceived that provision of water meter would aid in solving the water shortage issues of the town, 62.50% of them are females and 37.5% of them are males (Figure 9). Observing from the perspective of the males, 46.29% of the total males agree that the water meter implementation will solve the water shortage issues while 53.71% of them are

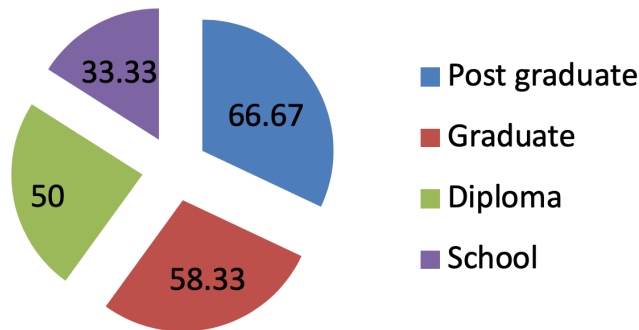


Figure 8. Acceptance of water meter provision based on education for water shortage issues

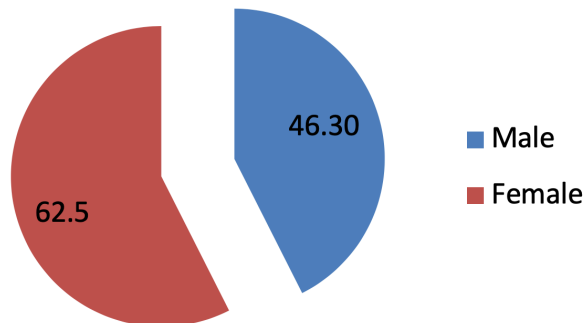


Figure 9. Acceptance of water meter provision based on gender for water shortage issues

against it. Based on gender, surprisingly, females are more favorable compared to the males.

3.8 Suggestions for improvement

As a part of the questionnaire, we requested the residents to provide suggestions for the enhancement of water conservation in the town of Pollachi. Some of those suggestions include: Increment in the supply time of water by the municipality, water should be supplied regularly, Bore water should not be mixed with municipality water, water supply pressure to be increased, reduction in the addition of chlorine, rainwater harvesting should be implemented in the houses, avoiding leakages in the pipes, people should be careful in the usage of water at homes, installation of sensors for automatic stoppage of pumps at home, good quality pipes should be provided for water supply.

4. Conclusion

In this study, the perception of the people of the Pollachi town on the implementation of a water meter system was analyzed using a questionnaire survey. The conclusion regarding the perceptions of the people regarding the provision of water meter, and other aspects such as water quantity, quality, health, etc. are as follows:

1) The water tax paid by the residents ranges from 300 rupees to 3,000 rupees in a year based on the number and type of water connection.

2) Each resident receives water supply at least once from the municipality, some of them even receive even four times a week and some receive daily water supply. The frequency of water supply is not uniform in all the locations around Pollachi.

3) Residents located within the city received water supply for a longer duration than those located in the periphery of the town. The duration of water supply decreases from the heart of the town to the outer sections.

4) The quality of water was perceived to be good by majority of the residents. The aged people felt that the quality was normal

or sometimes bad since they have a significant resident history compared to youngsters. Females also perceived the quality of water to be good while the males gave a mixed response.

5) Among educated groups, some perceived the need for boiling the water while some did not feel the need for boiling. Aged people generally did not boil the water as they tend to have higher immunity compared to the youngsters. There was a mixed response from the males and females regarding boiling of water and usage of filters.

6) Majority of the residents did not get sick by directly drinking this water supplied by the municipality which indicates that the water is predominantly good in quality.

7) Most of the residents perceive that the water has been treated with chlorine prior to the supply.

8) Perception of people over the provision of water meter in the house is mixed. Most of the males perceived that a water meter should be provided compared to the females.

9) Men felt that the provision will increase the water tax while the response from the females for this query was mixed.

10) Majority of the residents felt that the water meter provision strategy will solve the water shortage problems of the town. In this regard, women were more favorable compared to the males.

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