

# A STUDY OF WATER CONSUMPTION PATTERN IN ROHTAK CITY

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**ABSTRACT:** In order to understand domestic water demand and figure out which family uses use a lot of water, as well as other factors that add to high domestic water demand, patterns and trends in water use need to be looked at. A main poll was used to look at how much water people in Rohtak city used on four different bases. Before looking at the poll results, the usual amount of water used in the whole research area was looked at. The third important study basis is dividing the study area into three groups based on their physical features: section, town, and village. Third, the families that were surveyed were put into three groups based on their income: low, middle, and high. Fourth, the homes in the individual income group were split into two groups: joint families and single families.

**KEY WORDS:** - water consumption, domestic water demand, human survival.

**INTRODUCTION:** - Water is important for life, economic growth, energy production, food production, and overall human survival and long-term growth (Anthonj and Falkenberg, 2017). Having access to clean water is an important part of life. Everyone has the right to clean water to drink and toilets that are safe (Cahill, 2005). The UN Committee on Economic, Social, and Cultural Rights talked about the right to water in its general statement No. 15, which was passed in November 2002. It said "the human right to water entitles everyone to be sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses."

Also, in April 2011, Resolution 16/2 from the Human Rights Council said that having access to toilets and clean water was a basic human right, just like the right to life and human respect. A stable source of water and toilets must be available to everyone. This means that people usually use it for drinking, washing their hands, making food, cleaning their clothes, and keeping themselves and their homes clean (Noga and Wolbring, 2012). The World Health Organization (WHO) says that each person needs between 50 and 100 liters of water every day to make sure that their basic needs are met and that they don't get sick. The Sustainable Development Goals of the United Nations say that everyone will be able to get clean water and toilets.

It's important to tell the difference between the water needs for household chores, which have a big effect on health and efficiency, and the water needs for other uses, like energy production, transportation, farmland, industry, and relaxation. Most of the time, household water needs only make up a small part of the overall water demand (Gleick, 1993; 1996). Abderrahman (2000) said it was very important to make both short- and long-term national water plans based on correct estimates of how much water people will need. Researchers,

studies, and data collectors around the world don't look at how people use multiple water sources to meet their daily needs. This is a common and important practice in many poor countries. There isn't a lot of economics study that looks at how households in developing countries use different types of water (Coulibaly et al., 2014; Devoto et al., 2012; Nauges and Whittington, 2010; Pattanayak et al., 2005; Madanat and Humplick, 1993; Mu et al., 1990). Some studies, like Sanchez et al., 2015; Vedachalam et al., 2017; Tucker et al., 2014; Adekalu et al., 2002; Howard et al., 2002; and Almedom and Odhiambo, 1994, do go into more detail about the sources and amounts of water that different families use and how they change over time. Having more than one source of water at home is becoming more and more important. There are more and more studies that talk about this practice around the world and call for more research to be done, even though most of them don't focus on specific areas (Foster and Hope, 2017; Jeuland et al., 2016; Howard et al., 2016; Cominola et al., 2015; Overbo et al., 2016; Evans et al., 2013). Because of this, we don't know much about how to handle water in homes or how those methods change over time and place. Most world studies focus on the main source of drinking water for homes. This shows that families don't know how to use other water sources, and it makes the problem worse.

**OBJECTIVES OF THE STUDY:** Keeping in view, the various aspects of availability and consumption of water for domestic uses, this study has following objectives:

To establish the water consumption pattern.

To evaluate the determinants of water consumption pattern.

**HYPOTHESIS:** Income level directly influences water consumption pattern in the city.

**METHODOLOGY:** Rohtak city witnessed the growth not only in terms of urban expansion of area under municipal limits but also the population growth with a fast pace during last two decades. Thus, present study analyzed the spatio-temporal availability of water supply, present status of domestic water demand, water consumption pattern and its deterrments with reference to Rohtak city The status of present water supply is also analyzed through the collection of primary information from 600 sampled households from sectors (120 households), colonies (420 households) and villages (60 samples).

## **FINDINGS**

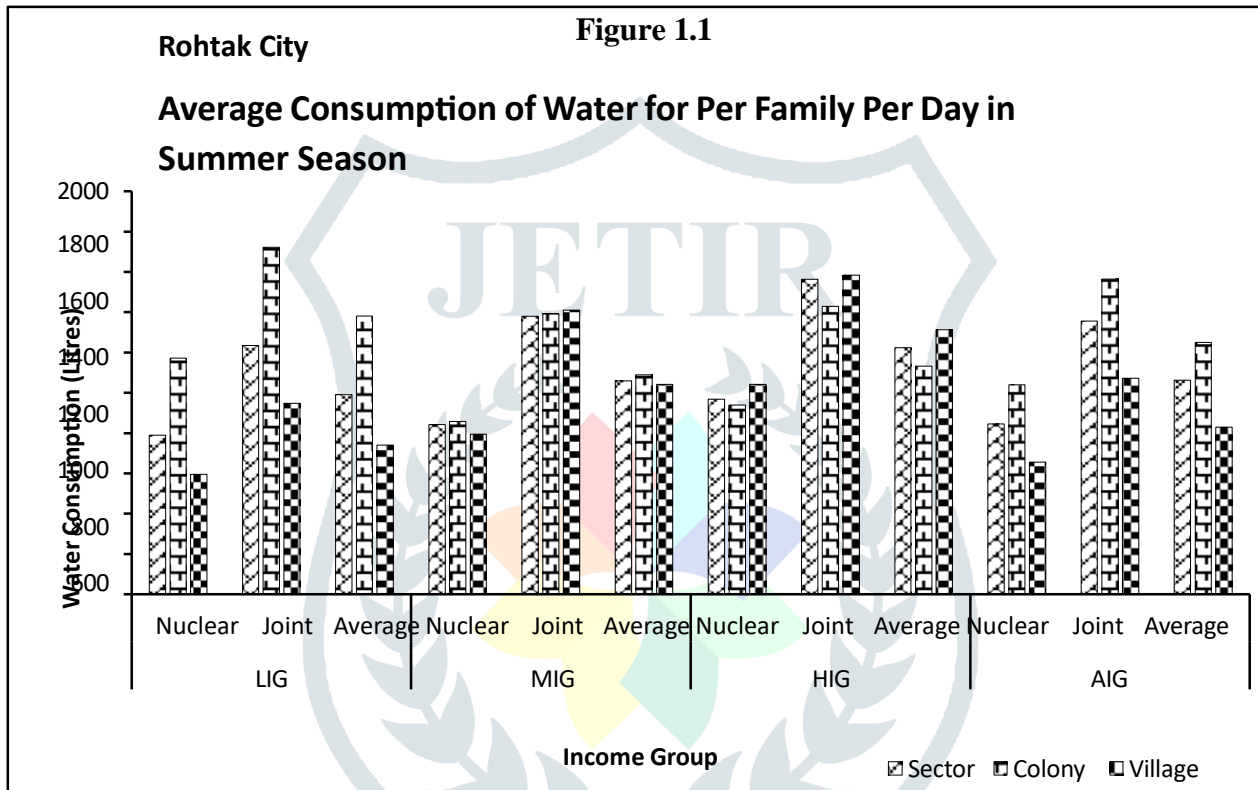
### **Domestic Water Consumption for All Kind of Purposes**

Using water for all sorts of things became more important as we moved toward more modern and environmentally friendly ways of living. With the help of a field study, one tried to figure out how much water each family used on average each day in the summer and winter.

**Table 1.1: Rohtak City: Average Consumption of Water for Per Family Per Day in Summer**

| Units        | Average Consumption of Water (Litres) Per Family Per Day |             |             |            |             |             |            |             |             |            |             |             |
|--------------|--|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|
|              | LIG  |             |             | MIG        |             |             | HIG        |             |             | AIG        |             |             |
|              | N  | J           | T           | N          | J           | T           | N          | J           | T           | N          | J           | T           |
| Sector       | 790  | 1235        | 991         | 843        | 1380        | 1060        | 969        | 1564        | 1224        | 846        | 1356        | 1063        |
| Colony       | 1172   | 1722        | 1381        | 858        | 1393        | 1089        | 939        | 1429        | 1133        | 1040       | 1565        | 1250        |
| Village      | 596  | 947         | 741         | 794        | 1410        | 1041        | 1041       | 1584        | 1313        | 656        | 1072        | 829         |
| <b>Total</b> | <b>1044</b>  | <b>1528</b> | <b>1235</b> | <b>850</b> | <b>1391</b> | <b>1079</b> | <b>951</b> | <b>1480</b> | <b>1169</b> | <b>965</b> | <b>1470</b> | <b>1170</b> |

Source: Based on field survey



The usual amount of water used by a family each day in the summer is shown in Table 1.1 and Figure 1.1. Here's a more in-depth look at that table and number, broken down by family type and income:

**(a) Lower Income Group:** There are 1235 liters of water used by each family in the lower income group (LIG) every day in the summer. In the summer, joint families use an average of 1528 liters of water per day, while single families use 1044 liters per day per family. Colony households use the most water overall, with 1381 liters per day per family. This is more than ninety-one liters used by sector households.

every day for each family). It was found that households in the village use the least amount of water, an average of 741 liters per day per family. Families with children in the same sector, colony, or village use less water than families with children in different sectors.

**(b) Medium Income Group:** For families with a middle income, the average amount of water used each day in the summer is 1079 liters per family. Because there are more people living in a joint family than in a nuclear family, the amounts of spending are higher in the joint family. For mixed families, the average amount of water used each day in the summer is 1,391 liters, while for single families, the average amount of water used

each day is 850 liters. During the summer, colony households used an average of 1089 liters of water per family per day, while sector households used an average of 1060 liters per family per day and village households used an average of 1041 liters per family per day.

**(c) High Income Group:** High-income families used an average of 1169 liters of water per day during the summer. This is more than the average of 1060 liters used by low-income families. Joint families drink more water than nuclear families (951 liters per day per family vs. 1,800 liters per day per family). In the summer, HIG households in the village used an average of 1313 liters of water per family per day, which is more than the 1224 liters per day that sector households used per family. HIG households in the colony used an average of 1133 liters of water per family per day, which is less than other households. The joint families use more water than the nuclear families in all of the areas, towns, and villages that were looked at.

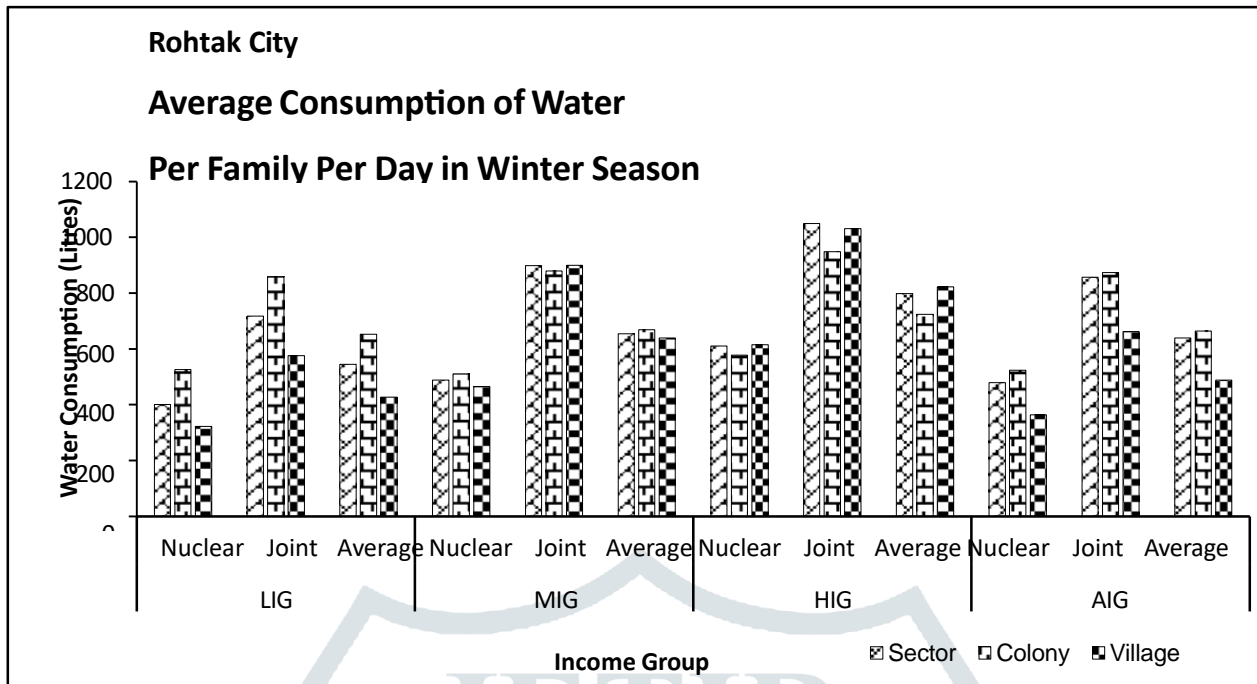
**(d) Average Income Group:** Based on the average amounts of water used in LIG, MIG, and HIG, it was found that each family used 1170 liters of water each day during the summer. This was more for joint family households (1470 liters per day per family) than for nuclear family households (965 liters per day per family). According to the study, colony households used 1250 liters of water per family per day on average during the summer, while sector households only used 1063 liters per family per day. It was found that village homes used the least amount of water each day, only 829 liters per family. The joint families use more water than the nuclear families in all of the areas, towns, and villages that were looked at.

**Table 1.2: Rohtak City: Average Consumption of Water Per Family Per Day in Winter Season**

| Units        | Average Consumption of Water (in liters) |            |            |            |            |            |            |            |            |            |            |            |
|--------------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              | LIG                                      |            |            | MIG        |            |            | HIG        |            |            | AIG        |            |            |
|              | N  | J          | T          | N          | J          | T          | N          | J          | T          | N          | J          | T          |
| Sector       | 400                                      | 717        | 544        | 488        | 898        | 654        | 610        | 1049       | 798        | 479        | 856        | 639        |
| Colony       | 526                                      | 857        | 652        | 510        | 879        | 669        | 578        | 948        | 724        | 524        | 874        | 664        |
| Village      | 322                                      | 575        | 427        | 465        | 899        | 639        | 615        | 1030       | 822        | 364        | 662        | 488        |
| <b>Total</b> | <b>482</b>                               | <b>792</b> | <b>604</b> | <b>501</b> | <b>885</b> | <b>663</b> | <b>588</b> | <b>984</b> | <b>751</b> | <b>499</b> | <b>848</b> | <b>641</b> |

Source: Based on field survey

Figure 1.2



The numbers in Table 1.2 and Figure 1.2 show how much water a normal family uses each day in the winter. Here's a more in-depth look at that table and number, broken down by family type and income:

**(a) Lower Income Group:** It was found that each family in the lower income group (LIG) uses 604 liters of water every day in the winter. In the winter, joint families use an average of 792 liters of water per family, while single families use an average of 482 liters per family. It was found that, on average, colony households used 652 liters of water per day per family, while sector households only used 544 liters and such. On average, each family in the town uses only 427 liters of water per day, which is the least of any community.

**(b) Medium Income Group:** For families with a middle income, the average amount of water they use each day in the winter is 663 liters. Because there are more people living in a joint family than in a nuclear family, the amounts of spending are higher in the joint family. For joint families, the average amount of water used each day in the winter is 885 liters, while the average amount of water used by single families is 501 liters per day per family. During the winter, colony households used an average of 669 liters of water per family per day, while sector households used an average of 654 liters per family per day and village households used an average of 639 liters per family per day.

**(c) High Income Group:** There was a difference in how much water each family used each day during the winter. Joint families used 984 liters of water each day, while single families only used 588 liters. This was found in households with better incomes. In the winter, HIG households in the village used an average of 822 liters of water per family per day, which is more than the 798 liters per day that sector households used per family. In the colony, HIG households used less water than other households, with each family using an average of 724 liters per day.



**(d) Average Income Group:** Researchers found that during the winter, the average amount of water used by each family each day was 641 liters. Joint family households used 848 liters of water each day, while nuclear family households used 499 liters per day. Researchers found that, in the winter, colony households used an average of 664 liters of water per family per day, while sector households only used 639 liters per family per day. It was found that village homes used the least amount of water each day, an average of 488 liters per family, in the winter.

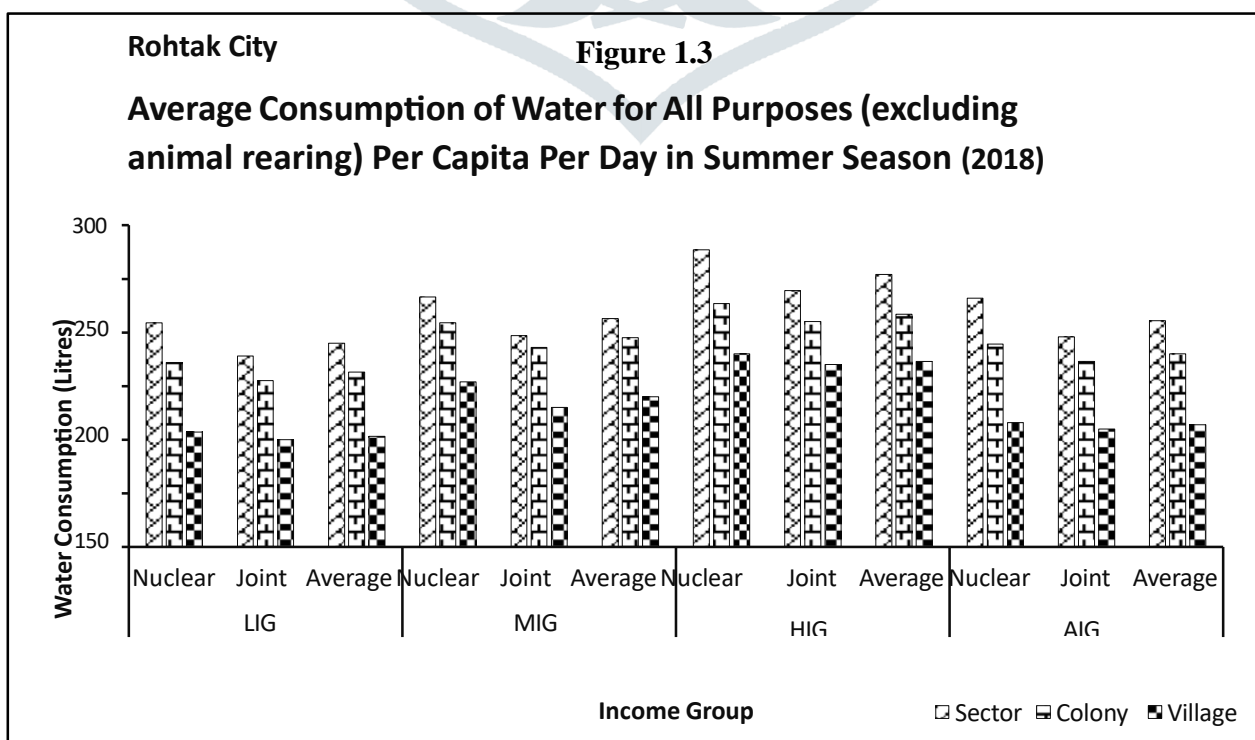
**Domestic Water Consumption Per Capita Per Day for All Kinds of Purposes**

In India, the average amount of water used for household purposes each day is 200 liters for people who live in cities and 135 liters for families with less money, according to Indian standards. 5 liters, 5 liters, 55 liters, 20 liters, 10 liters, 10 liters, and 30 liters of water are set aside for drinking, cooking, swimming, washing clothes and dishes, cleaning the house, and flushing toilets. That being said, a test study showed that the families have used water for other reasons besides those listed above. That's why the study included all the groups that use water for household purposes.

**Table 1.3: Rohtak City: Average Consumption of Water for All Purposes (excluding animal rearing) Per Capita Per Day in Summer Season**

| Units        | Average Consumption of Water (in liters) Per Capita Per Day |            |            |            |            |            |            |            |            |            |            |            |
|--------------|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              | LIG   |            |            | MIG        |            |            | HIG        |            |            | AIG        |            |            |
|              | N   | J          | T          | N          | J          | T          | N          | J          | T          | N          | J          | T          |
| Sector       | 209   | 178        | 190        | 233        | 197        | 213        | 277        | 239        | 254        | 232        | 196        | 211        |
| Colony       | 172   | 155        | 163        | 209        | 186        | 195        | 227        | 210        | 217        | 189        | 173        | 180        |
| Village      | 107   | 100        | 103        | 154        | 130        | 140        | 180        | 170        | 173        | 116        | 110        | 114        |
| <b>Total</b> | <b>169</b>  | <b>150</b> | <b>158</b> | <b>212</b> | <b>186</b> | <b>197</b> | <b>237</b> | <b>215</b> | <b>225</b> | <b>190</b> | <b>171</b> | <b>179</b> |

Source: Based on field survey



The average amount of water used by each person each day in the summer is shown in Table 1.3 and Figure 1.3. Here's a more in-depth look at that table and number, broken down by family type and income:

**(a) Lower Income Group:** Water use per person per day in the summer is found to be 158 liters in the lower income group (LIG). Nuclear families use an average of 169 liters of water per person per day, while joint families use 150 liters of water per person per day during the summer. This study found that sector homes used 190 liters of water per person per day, while single and joint families used 209 liters and 178 liters of water per person per day, respectively. Each person in a LIG home in the colony uses 163 liters of water each year, while each person in a nuclear family uses 172 liters and each person in a joint family uses 155 liters. On the other hand, LIG homes in the village use 103 liters of water per person per day. Nuclear families and joint families use 107 liters and 100 liters of water per person per day, respectively.

**(b) Medium Income Group:** The average amount of water used by a person in the middle-income group each day is 197 liters. This is higher for nuclear families (212 liters) than for joint families (186 liters). On the other hand, sector homes used an average of 213 liters of water per person per day, while married and joint families used 233 liters and 197 liters of water per person per day, respectively. It was found that MIG homes in the neighborhood used 195 liters of water per person per day, while single and joint families used 209 liters and 186 liters of water per person per day, respectively. Village homes use the least amount of water each day (140 liters), while single families use 154 liters and joint families use 130 liters.

**(c) High Income Group:** The average amount of water used by each person in a HIG home each day is 225 liters. This number is higher in nuclear families (237 liters) than in joint families (215 liters). In the summer, HIG families in the sector used an average of 254 liters of water per person, which is more than the average of 164 liters per day in other sectors. Which nuclear families use 277 liters of water per person per day and which joint families use 239 liters per person per day? Every day, each person in a HIG home in the colony used 217 liters of water. Nuclear families and mixed families, on the other hand, used 227 liters and 210 liters of water, respectively. The amount of water used per person per day is lowest in village homes (173 liters), followed by nuclear families (180 liters) and joint families (170 liters).

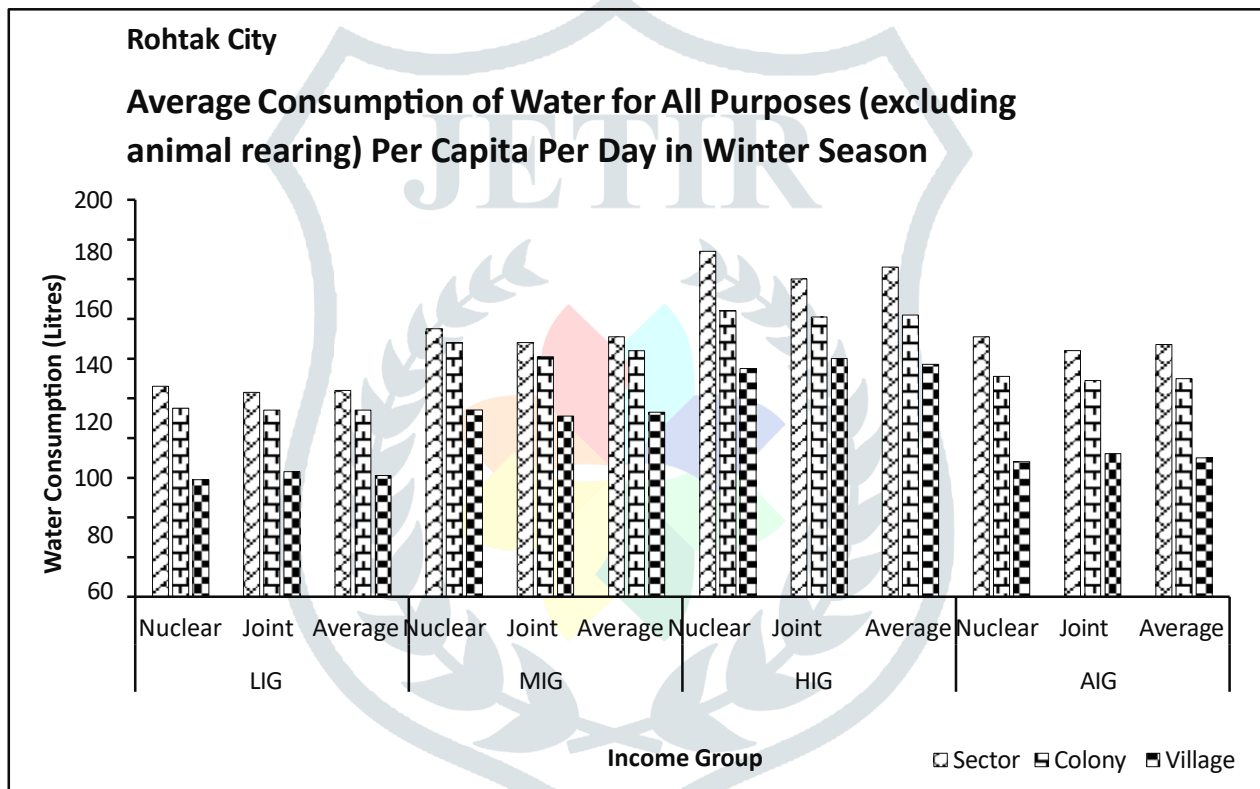
**(d) Average Income Group:** According to the average amounts of water used in LIG, MIG, and HIG, each person uses 179 liters of water every day. Nuclear families use more water than joint family homes, which use 171 liters and 190 liters, respectively. There was a higher average daily water use of 211 liters per person in sector homes during the summer than in paired or joint families, which used 232 liters per person and 196 liters per person, respectively. It was found that HIG homes in the neighborhood used 180 liters of water per person per day, while single and joint families used 189 liters and 173 liters of water per person per day, respectively. Individuals living in village homes use the least amount of water each day (114 liters), while single families and joint families use the most (116 and 110 liters, respectively).

**Table 1.4: Rohtak City: Average Consumption of Water for All Purposes (excluding animal rearing) Per Capita Per Day in Winter Season**

| Units        | Average Consumption of Water (in liters) Per Capita Per Day |           |           |            |            |            |            |            |            |            |            |            |
|--------------|---|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              | LIG   |           |           | MIG        |            |            | HIG        |            |            | AIG        |            |            |
|              | N   | J         | T         | N          | J          | T          | N          | J          | T          | N          | J          | T          |
| Sector       | 106   | 103       | 104       | 135        | 128        | 131        | 174        | 160        | 166        | 131        | 124        | 127        |
| Colony       | 95  | 94        | 94        | 128        | 121        | 124        | 144        | 141        | 142        | 111        | 109        | 110        |
| Village      | 59  | 63        | 61        | 94         | 91         | 93         | 115        | 120        | 117        | 68         | 72         | 70         |
| <b>Total</b> | <b>92</b>   | <b>90</b> | <b>90</b> | <b>128</b> | <b>121</b> | <b>124</b> | <b>150</b> | <b>145</b> | <b>147</b> | <b>110</b> | <b>108</b> | <b>109</b> |

Source: Based on field survey

**Figure 1.4**



The average amount of water used by each person each day in the winter is shown in Table 1.4 and Figure 1.4. Here's a more in-depth look at that table and number, broken down by family type and income:

**(a) Lower Income Group:** In the winter, the lower income group (LIG) uses 90 liters of water per person per day that is measured. It is more common for nuclear families to use 92 liters of water per person per day, while mixed families use 90 liters per person per day during the winter. It was found that sector homes used an average of 104 liters of water per person per day during the winter, while paired and joint families used 106 liters and 103 liters of water per person per day, respectively. People living in colony homes used 94 liters of water per day, while people living in nuclear and joint families used 95 liters and 94 liters of water per day, respectively. The amount of water used per person per day is lowest in village households (61 liters), followed by nuclear families (59 liters) and joint families (63 liters). This is all during the winter.



**(b)Medium Income Group:** The average amount of water used by a person in a medium-income group each day in the winter is 124 liters. This number is higher for nuclear families (128 liters) than for joint families (121 liters). When it comes to water use, sector homes used an average of 131 liters per person per day during the winter, while paired and joint families used 135 liters and 128 liters per person per day, respectively. In colony homes, each person used 124 liters of water every day. In nuclear and mixed families, each person used 128 liters of water every day, and this difference was not significant. In the winter, homes in villages use the least amount of water per person per day (93 liters). Nuclear families use the most water per person per day (94 liters), followed by joint families at 91 liters.

**(c)High Income Group:** The average amount of water used by each person in a HIG home each day is 147 liters. This number is higher in nuclear families (150 liters) than in joint families (145 liters). When it comes to water use, sector homes used an average of 166 liters per person per day during the winter, while single and joint families used 174 liters and 160 liters per person per day, respectively. It was found that colony homes used 142 liters of water per person per day, while single and joint families used 144 liters and 141 liters of water per person per day, respectively. The amount of water used per person per day is lowest in village homes (117 liters), followed by nuclear families (115 liters) and joint families (120 liters).

**(d)Average Income Group:** It is found that the average water consumption per capita per day is found to be 109 liters which is higher for nuclear families (110 liters) as compared to joint family households (108 liters). Sector households had higher average consumption of water per capita during winter season that is found to be 127 liters per day in which nuclear and joint families have the consumption of 131 litres and 124 litres per capita per day respectively. The colony households had the consumption of 110 liters of water per capita per day in which nuclear and joint families have the consumption of 111 litres and 109 litres of water per capita per day respectively. The per capita per day water consumption is found lowest in households of village (70 liters) in which nuclear and joint families have the consumption of 68 litres and 72 litres of water per capita per day respectively.

**Conclusion** Low-income towns, on the other hand, use the least amount of water for all uses in the summer. It has been found that during the winter, people with high incomes use a lot of water for all of their household needs. On the other hand, people in towns with lower incomes use the least amount of water for all of their needs. . Unfortunately, the village people don't have access to enough water, so they use less water overall. The amount of water used for drinking in homes is high, and a lot of water is also used for RO water treatment. Animal farming uses the most water on average in the study area. It was found that sector households, especially those with high incomes, used the most water for all purposes (not just raising animals), both in the summer and the winter. Village residents, especially those with lower incomes, used the least amount of water for all purposes.

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