

Chapter- 3
Status of Drinking Water Supply

Chapter 3

STATUS OF DRINKING WATER SUPPLY

3.1 Introduction

Water is the most vital resource for the existence of life on the earth. It is indispensable for the existence of plants and animal eco-system and forms an essential element in the development of economic activities. No other natural resource has such an overwhelming influence on human history. World Ocean covers about three fourths of the earth's surface. However, fresh water constitutes an affluent causes deoxygenating and health hazards. Water is an essential requirement for human life. Safe drinking water is most important aspect for human life. But water is limited natural resource. It is also a precious national asset. In recent decades human demand and misuse of water resource become major issue of humanity. It's per capita availability become less and less for the simple reason that the population is increasing at very fast rate where as the total availability of water continue to remain constant in India. Therefore, water security for human life has become a matter of principal concern for sustainable development in 21st century. Today there is no any place where safe adequate drinking water is available for human being. The pollutants usually associated with industrial effluents are organic matter thermal constituents in the form of the heat suspended solid and micro organism and pathogens organic pollutants decrease below limit of the dissolved important bad odor and color to affluent.

Today almost a one third of total population in India does not have access to safe drinking water. Nearly 250 millions Indian depend on untreated and unsafe source of drinking water. Unsafe source of drinking water supply is worried dimension because it is hygienic for human being. Nearly 10 millions people every year suffer from cholera diarrhea, gastroenteritis, malaria, guinea worm etc. The causes of such kind of diseases are directly attributed to lack of physical infrastructure, especially unsafe condition of drinking water procurement. Water is most precious and indispensable resource and fundamental to survival of human being, livestock and the plants. Water which is essential for life, growth and health, can also be a source of spread diseases and causes of ill health, if contaminated water properly handled and stored. The UNDP's Human Development Report -2000, defined access to safe drinking water as the proportion of population using any of the following types of water supply for drinking i.e., piped water, public tap, borehole or pump, well etc. are very small proportion of this enormous quantity. About 2.7 per cent of the

total water available on the earth, about 75.2 per cent of fresh water lies frozen in Polar Regions and another 22.6 per cent is present in the groundwater. The rest is available in lakes, river, atmospheric moisture, soil and vegetation. Water, effectively available for consumption and other uses, is small in proportion of the quantity available in rivers, lakes and ground water. According to the World Health Organization, less than 1 per cent of the world's freshwater or 0.007 per cent of all the water on the earth is readily available for human world consumption. As the human population increases the demand of freshwater resources is also more. The supply of water from the tanks is always regarded in the pre history with the onset of development and modern urbanization. However, water supply for domestic and commercial use has become an important municipal service. Water supply is a basic amenity in municipal area. Some water supply is done from canal and other storage like pond, tube well, water tank after filtration and purification are not injurious to health and but through after source of drinking water supply in which raw materials mixed used without proper purification is injurious to health.

The urban population faces demand supply gap of water. The wholly inadequate and unreliable supplies of drinking water particularly in settlements of the urban poor, and deteriorating financial and technical performance of system. In high income group areas of cities in Asia, Latin America and Sub Saharan Africa people enjoy access to several hundred liters of water a day delivered into their homes at low prices by public utilities. Meanwhile slum dwellers and the poor householders in rural areas of the same countries have access to much less than 20 litres of water a day per person required to meet the most basic human needs. Clean water is most powerful driver for human development. They extend opportunity, enhance dignity and help create a various cycle of improving health and rising wealth. People living in rich countries today are only dimly aware of how clean water fostered social progress in their own countries. Urbanization and rapid growth in urban population can dramatically increase per capita use of freshwater. The fast population growth with accelerated urbanization, combined with scarce water supplies means that the governments all over world often cannot supply enough. The number of urban residents are without access to improve water resource increase from 113 millions in 1990 (5 % of total urban population) to 173 millions in 2000 (6 % of total urban population). According to a study by WHO and UNICEF (UN Report)⁷, Provision of clean drinking water, sanitation and a clean environment are vital to improve the health of our people and to reduce incidence of diseases and deaths. Women and girls spend hours fetching water and that drudgery should be unnecessary. Drudgery is

⁷ WHO/UNICEF, Joint Monitoring Programme for Water Supply and Sanitation, 2001.

undesirable in itself and it also takes away other opportunities for self development. Drinking water is less than 1% of the total water demand and should have the first priority among all uses of water supply in urban areas is also far from satisfactory. According to Eleventh Five Year Plan (2007-2012) as on 31 March, 2004, about 91% of the urban population has got access to water supply facilities. However, this access does not ensure adequacy and equitable distribution and the per capita availability is also not as per norms in many areas. Average access to drinking water is highest in class I town (73%), followed by class II town (63%), class III town (61%) and other town (58%)⁸. Poor people in slums and squatter settlements are generally deprived of these basics amenities. The population coverage in the past decades and end of March, 2004 is as shown in table 3.1.

Table 3.1 Total Urban Population Covered With Water Supply, 2004

Year	Urban population (in Millions)	Population covered with water supply (%)
1981	152	78
1991	217	84
2001	285	89
2004	308 (Projected)	91

Source: Planning Commission Eleventh five Year Plan, 2007.

Table 3.1 reveal that total urban population which has been covered with water supply in 1981 to 2004. The coverage of water supply was 78% (152 millions people) population which has been increased with 84% (217 millions people) in 1991. After one decade only 5 % more population got supply of water. But in 2004 the coverage of water supply increased and to 91% of total urban population. Due to urbanization the urban population is increasing at very fast rate. While the supply and sources of water supply will also be declining very fast rate. So the supply of water in whole India (rural + urban) will be faced very big scarcity.

As per census of India, if a household has access to drinking water supplied from a tap, hand pump, tube well within or outside the premises, it is considered as having access to safe drinking water. Census 1991 reported that the coverage of households in India having access to

⁸ Planning commission eleventh five year plan, 2007, New Delhi, Dec, pp 168.

safe drinking water was 62 per cent, comprising over 81 per cent of urban households and around 56 per cent of rural households (P.C. Bansil, 2004)⁹. The quantity of urban water supply is also poor. Water is supplied only for few hours of the day which leads to a lot of waste as taps are kept open and water is not stored properly. One of the interesting things is that the urban areas where population is increasing at very fast rate but the level of underground water is also gone down at alarming rate. So, in recent decades people face the problem of adequate supply of water.

3.2 Status of Drinking Water Supply in India

According to census of India 2001, the main sources of drinking water supply in India are hand pump, tube wells, tap, and wells etc. The detail information of drinking water supply in India is given below in table 3. 2. It shows that most dominant source of water supply in the country is tube wells because most of the population or (41.21 per cent) are depend on it. But in resent days the level of under ground water has been gone down and down so some tube wells have low quantity of water and some are dry for the future prospect it is a matter of serious concern.

Table 3.2 Sources of Drinking Water in India, 2001

Source of drinking water supply	No. of household (in millions)	Per centage (%)
Total households	191.9	100.00
Within premises	74.8	39.0
Near premises	85.1	44.0
Away from premises	32.0	16.7
Hand pump/tube well	79.1	41.2
Tap	70.1	36.7

⁹ P.C. Bansil (2004) “Rural water problem”, Water resource management in India, concept publishing company, New Delhi, pp 166.

Well	34.9	18.2
Other	7.5	3.9

Source: Housing table, census of India, 2001

Table 3.2 and figure 3.1 represent the sources of drinking water supply in India. The total number of households is 191.9 millions in which 75 million (39.9%) households are getting water from the premises (2001). It has also been noted that 32 million (16.7%) households have to fetch drinking water from the available sources which are at least 500 meters away for the villages and 100 metres away in the case of town. While 85 million (44.3%) households get water near the premises. Figure 3.1 and the table 3.2 also indicate that the main sources of drinking water supply in the India in 2001. It shows hand pump/tube wells which are the most popular source of drinking water is reported to be used by 79 million (41.2%) households. Another source of drinking water is tap water supply which served 70.4 million (36.7%) households. Other sources like well, pond, river, canal etc are also alternate sources of drinking water supply in India which shares 22.1 per cent of total water supply

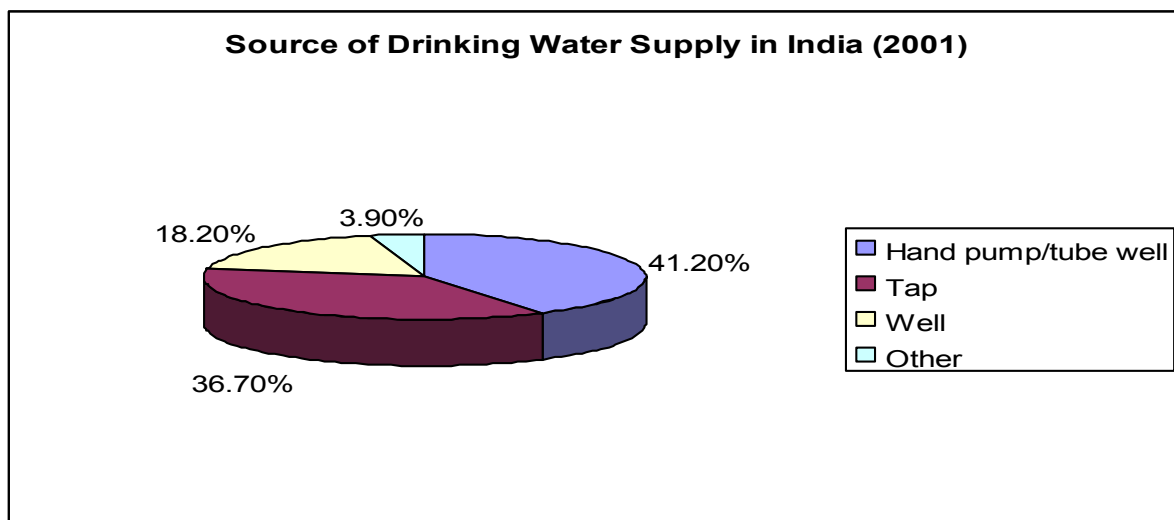


Figure 3.1

3.3 Status of Drinking Water Supply in Haryana

Haryana state has different sources of drinking water supply. Most of the state depends on tap water supply. Hand pumps, tube well, well, tank/ponds, canal etc. are alternate sources of

water supply in the state. Table 3.3 records the status of drinking water supply including in Haryana state, 2001.

Table 3.3: Distribution of Households by Sources of Drinking Water Supply in Rural/Urban Area in Haryana, 2001

Source	Tap	Hand pump	Tube well	Well	Pond/ Tank/ lake	River / canal	Spring	Any other
Total	48.1	31.7	6.2	11.7	0.6	0.4	0.2	1.2
Urban	77.7	22.5	3.1	0.5	0.2	0.1	0.1	1.4
Rural	37.8	35.7	7.6	16.5	0.7	0.5	0.2	1

Source: Public Health Department, Panchkula, Building Bays 13-20, Sector-4, Panchkula, 2001

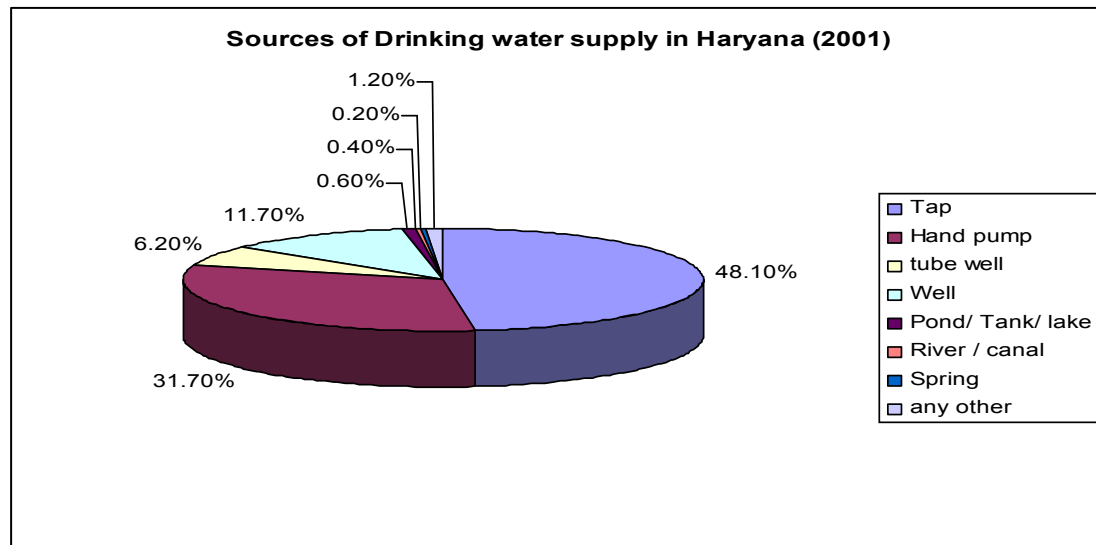


Figure 3.2

Table 3.3 show main sources of drinking water supply in Haryana state. Depicts the main sources of drinking water supply in urban/rural area of Haryana state i.e. tap, hand pump, well and tube well etc. Tap water is an important source of water supply in Haryana, which

provide 48.1 per cent of total water supply. Another important source of water supply in the state is hand pump, which provides 31.7 per cent of total water supply. Tube well, tanks, canal, springs are another alternative source of drinking water supply in Haryana state, 2001.

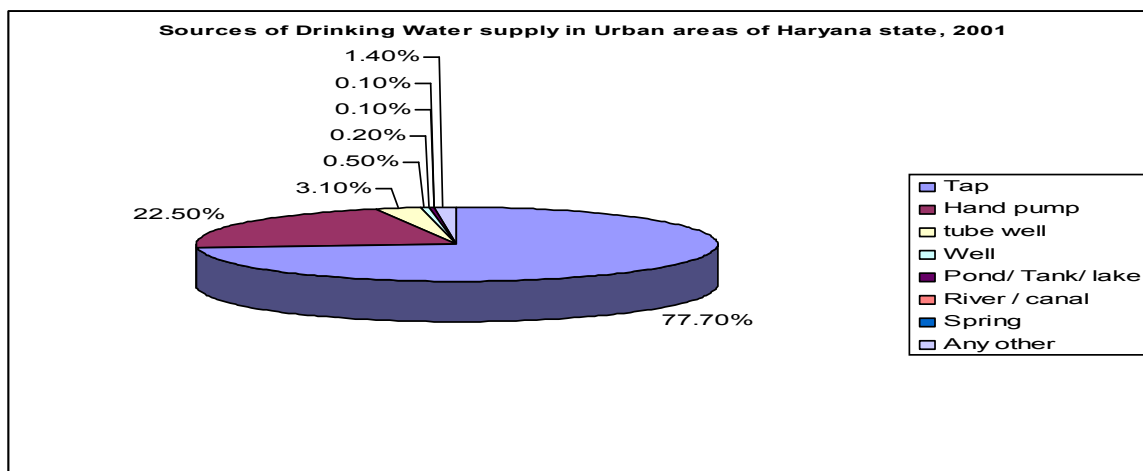


Figure 3.3

Figure 3.3 shows the contribution of different sources of water supply in urban areas of Haryana state. Most of the urban areas of the states depend on tap water supply which shares 77.7 per cent of total water supply. Hand pumps are other important sources of water supply. Tube well, pond, well, canal and springs are another alternate sources of water supply in the state.

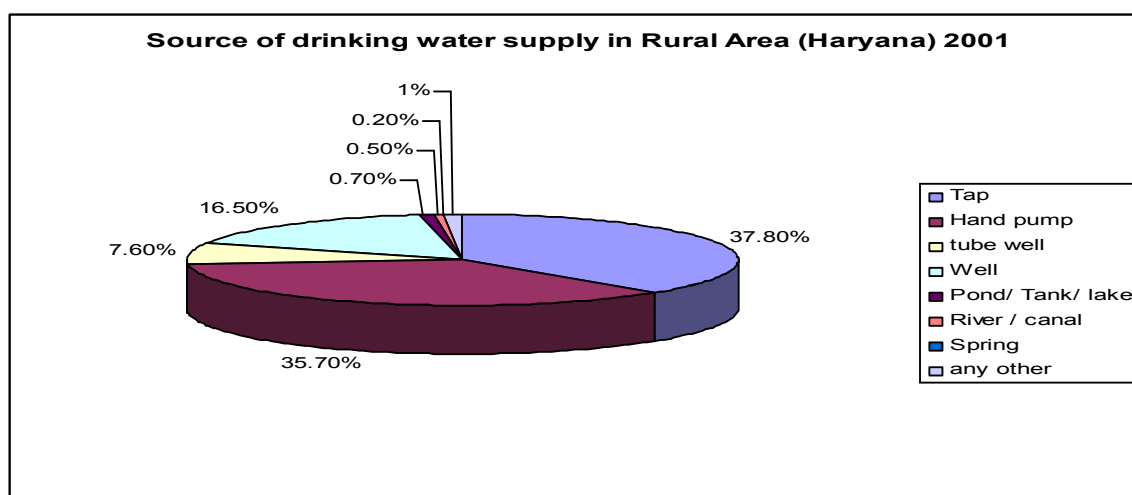


Figure 3.4

Figure 3.4 shows the sources water supply in rural area of the state. In rural areas of the state, tap and hand pumps are two important sources of water supply which provide 37.8 per cent

and 35.7 per cent respectively of total rural water supply. Tube well, well, ponds, canal are also alternate source of water supply in the rural areas.

3.4 Status of Drinking Water Supply in Narnaul Town

Narnaul town got water from the different sources which are located within the premises, near the premises and away from the premises. The pipe water supply in the town has been commissioned in 1962. In 1978 the per capita consumption of water supply was 70 LPCD, which has been increased 105 LPCD during 2001. After it has been decreased by 80 LPCD due to increase of population the level of underground water has gone down so some tube wells, and wells dried. So quantity of water has been also decreasing every year. Due to deficiency of water people face many type of problem to fetch water. Due to deficiency of rainfall the level of underground water has been gone down so some tube wells are dry and some have very low quantity of water.

3.5 Main Sources of Water Supply

In 1990 to 2005 the main sources of water supply was wells, tube wells, hand pumps and canal. But the level of underground water is decreasing at very fast rate. So due to this problem hand pumps and some wells are dry and some sources have very low quantity of water at present which creates big problems in the future. Some part of the town is facing big problem for drinking water especially in the central part of the town due to pipe line is very old and poorly maintained. At the present the main sources of drinking water supply in the town are tube wells, and canal water after filtration. The town gets maximum water from tube wells (65%) which are situated near by villages so tube wells are major source of water supply and only 35 per cent water is received from canal after filtration. So Narnaul town get water from two sources of water supply i.e. (i) tube wells (ii) canal.

Table 3.4: Ward Wise Availability of Drinking Water through Different Sources in the Town, 2009-2010

S. No.	Sources of water supply	Supply of water from different sources (in gallons / day)	Percentage of supply	No. of stations	Ward No.
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1	Tube well	10,56,000	64.55	29	3, 4, 5, 6, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, 23
2	Canal	5,80,000	35.45	3	1, 2, 7, 10, 11, 12, 13, 14
	Total	16,36,000	100	32	23

Source: Public Health Department, Narnaul, 2009-10

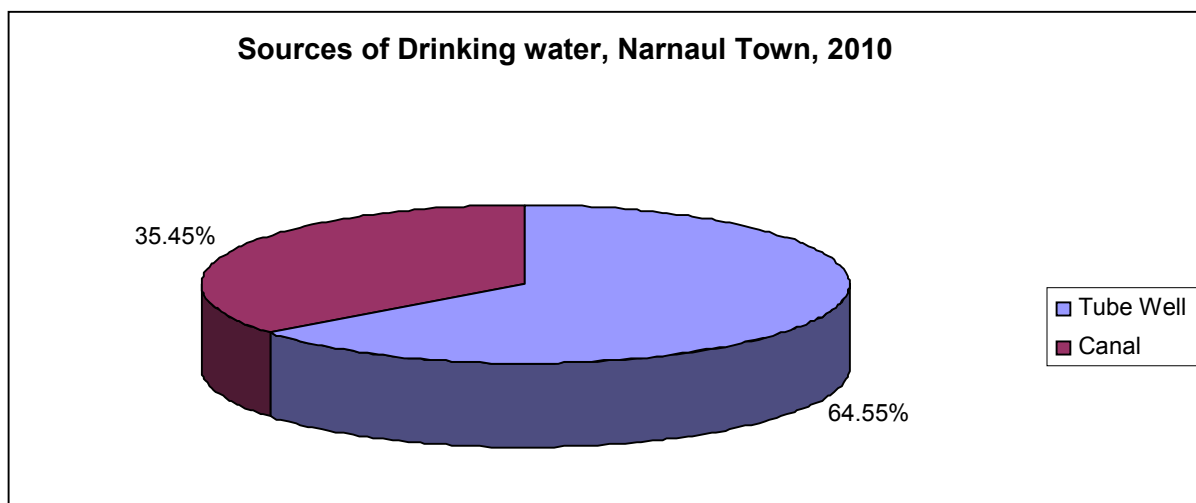


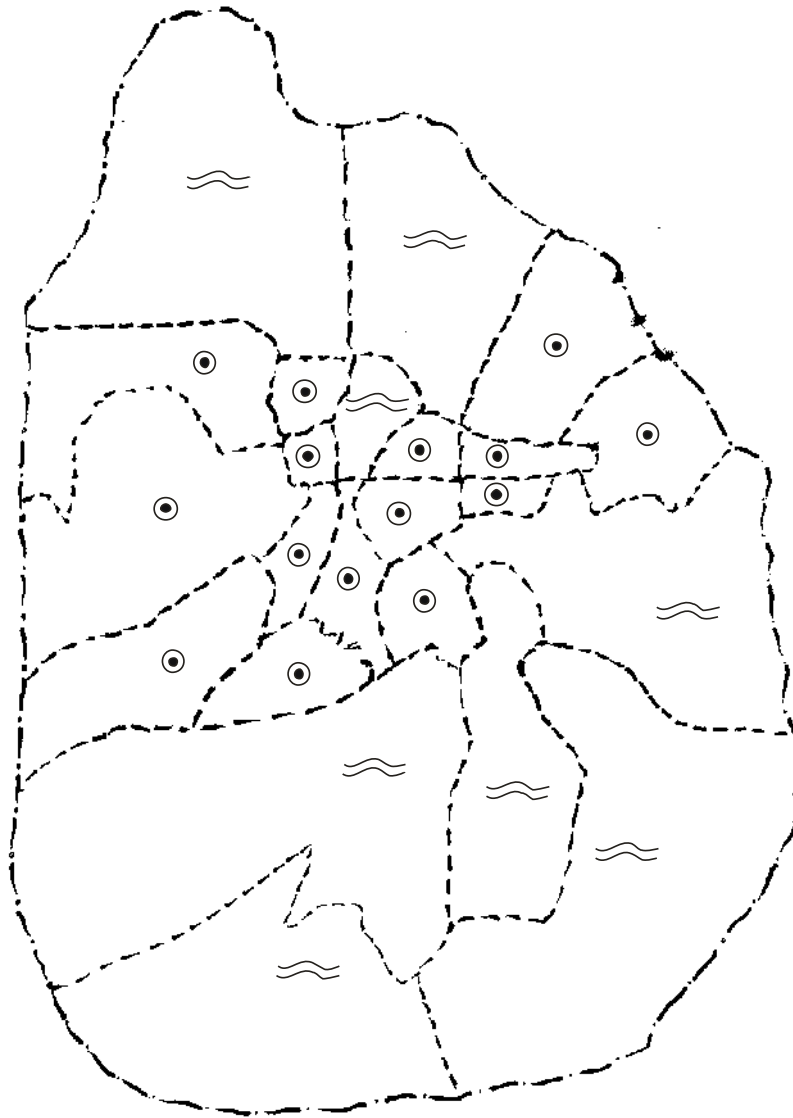
Figure 3.5

Table 3.4 and figure 3.5 depict the main source of drinking water supply of the town. In the recent days almost all households get drinking water through tube wells and from canal water after filtration through pipelines. It is recorded that maximum of drinking water supply covered by the tube well i.e. 65 per cent from near by village and only 35 per cent water is received from canal after filtration. It is also noticed that most of the tube well are located near by villages like Patikra, Kojinda, Kadipuri, Rambas of Narnaul town (figure 3.6) while 35 per cent of drinking water is supplied by canal water after filtration. The filtration plants are situated near Patikra village and Nasibpur village (3.6).

Table 3.4 also records the quantity of water supply through tube wells Narnaul town. The following wards 3, 4, 5, 6, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22 and 23 get water supply from tube wells which are situated nearest villages of the town. The amount of supply of tube well water is 10,56,000 gallons. Other remaining wards 1, 2, 7, 10, 11, 12, 13 and 14 get water supply from canal after filtration which is 5,80,000 gallons. So it shows that tube wells play a very important role to provide drinking water supply for the town.

Figure 3.6 also shows the distribution of water supply through different sources like canal and tube wells. It indicates that mostly the inner wards are getting water from tube wells and the peripheral wards are getting water from the canal.

**NARNAUL TOWN
WATER SUPPLY DISTRIBUTION
FROM DIFFERENT SOURCES
2010**





-  Canal Water Supply
-  Tubewell Water Supply



Fig. - 3.6

Table 3.5: Drinking Water Supply Through Tube Wells, Narnaul Town, 2009-10

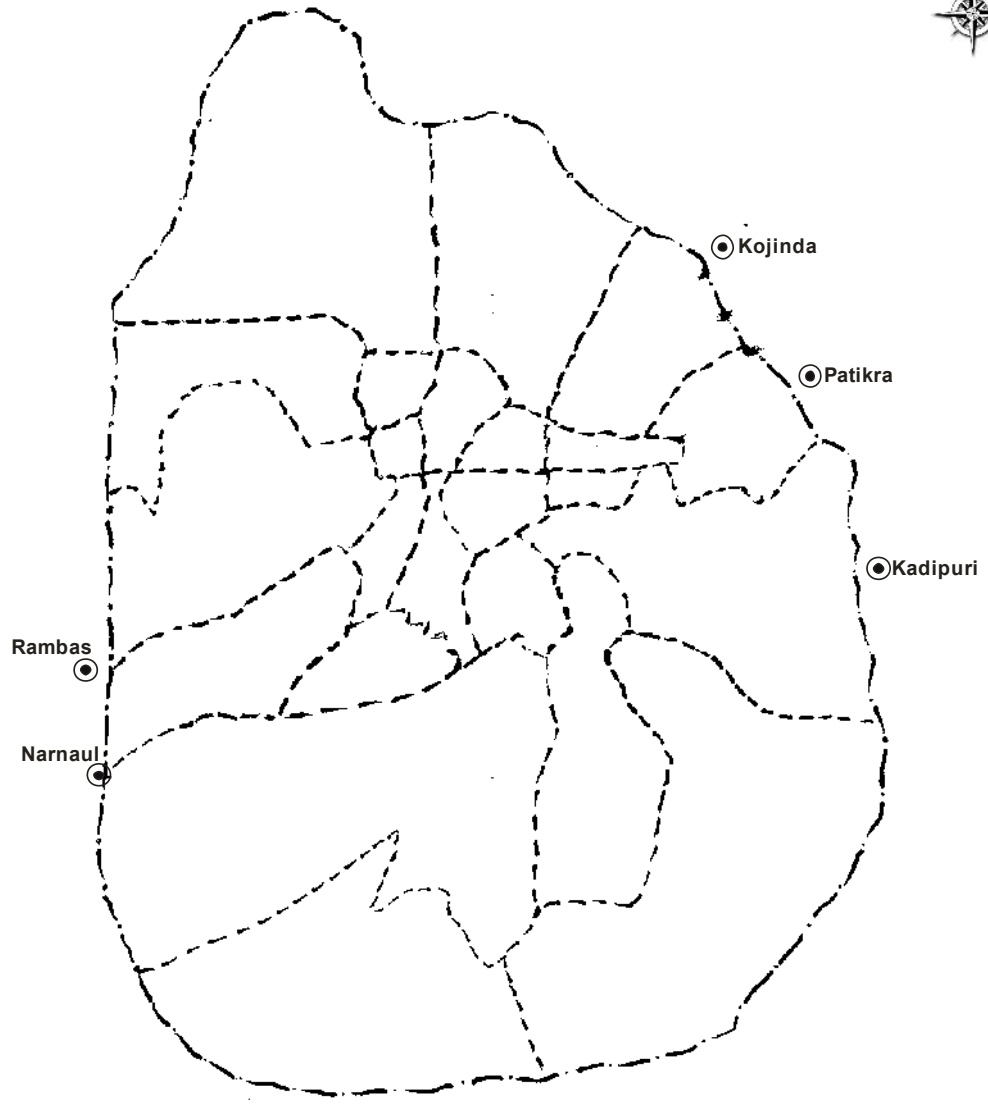
Sr. No.	Name of the place	Supply of water (In gallons /day)	Per centage (%)
1	Patikra	4,90,000	46
2	Kojinda	2,20,000	21
3	Kadipuri	1,28,000	12
4	Narnaul	1,16,000	11
5	Rambas	1,02,000	10
	Total	10,56,000	100

Source: Public Health Department Narnaul (2009-10)

Table 3.5 and figure 3.7 records the amount of water supply through tube wells and location of tube wells. They are situated in neare the villages like Patikra, Kojinda, Rambas, and Kadipuri. It shows the maximum quantity of water is supplied by nearest village Patikra which is 4,90,000 (46%) gallons and the remaining four places are supplied 54% water from the tube wells. Table 3.5 records that maximum quantity of water i.e. 4,90,000 (46%) gallons per day is supplied from tube wells from the nearest village Patikra followed by 2,20,000 (21%) gallons from Kojinda, 1,28,000 (12%) gallons from Kadipuri, 1,16,000 (11%) gallons from Narnaul and 1,02,000 (10%) gallons from Rambas. But at the present time the main problem of water supply is decreasing the level of the under ground water. So Patikra village plays a major role to provide drinking water for the town. But due to deficiency of rainfall the level of under ground water going down and down, so the quantity of water supply is also decreasing every year. For the future prospects it is a matter of great concern.

Figure 3.7 shows the location of tube well in Narnaul town, 2009-10. It indicates that maximum tube wells are located in the North West side of Narnaul town and some of

**NARNAUL TOWN
LOCATION OF TUBEWELL
2010**



● Location of Tubewell



Fig. - 3.7

them like Patikra, Kojinda, Kadipuri and Rambas in the south east Narnaul (2009-10). It also shows that the nearest villages are playing very important role for providing drinking water for the town because out of total, 65% of water is supplied from nearest village.

Table 3.6: Canal Based Water Supply, Narnaul Town, 2010

Sr. No.	Name of Place	Shift	Running hour	Water Capacity (gallons)	Per centage (%)
1	Near Patikra	3	20 hrs	4,00,000	68.97
2	Near Nasibpur	2	12 hrs	1,80,000	31.03
	Total	5	32	5,80,000	100

Source: Public Health Department, Narnaul Town (2009-10)

Table 3.6 shows the canal based water supply of the town, which gets 35 % (5,80,000 gallons /day) of total water supply through canal. It has been noticed that the canal water supply is made effective after fifteen days gap. So remaining 15 days this water is stored in under ground storage tank. After filtration the water is supplied to the nearest wards. Main boosting station of filtration plants is located near the village Patikra and Nasibpur. Patikra village provides 4,00,000 (68.97 %) gallons water per day in three shifts while Nasibpur village provides 1, 18,000 (31.03 %) gallons (water per day in two shifts for the town.

Table 3.7 and figure 3.8 show the location of storage tanks and their capacity. There are 8 storage tanks located at 5 different points i.e. PWD rest house and Subhash Park are located in wards 1 and 7 in the northern side of the town and Bawripur Sr. Sec. School and Mali tibba near the wards 1, 8, 13, 14 and 18 respectively. These storage capacity differ from the highest 3,30,000 gallons and 1,00,000 gallons stored in size tank i.e of . 2×69, 69.3' × 10 and 7×40' × 70×10 of two storage tank of PWD rest house storage tank respectively, followed by Subhash Park tank of 1,00,600 gallons stored in the size of 1×40' × 40' × 6'4", Malitibba tank of 75,000 gallons of size of 11×40' ×30'×10', Bawripur 35,000 gallons of 1×27 ×10 and dia two tanks ofSr. Sec. School capacity of 15,000 gallons and 25000 gallons of size of tank 1×27 dia × dia × 8'66' and 1×25 dia ×

12' respectively, which indicates that about 5,80,000 gallons of water is available for drinking purpose in the town during 2009-10

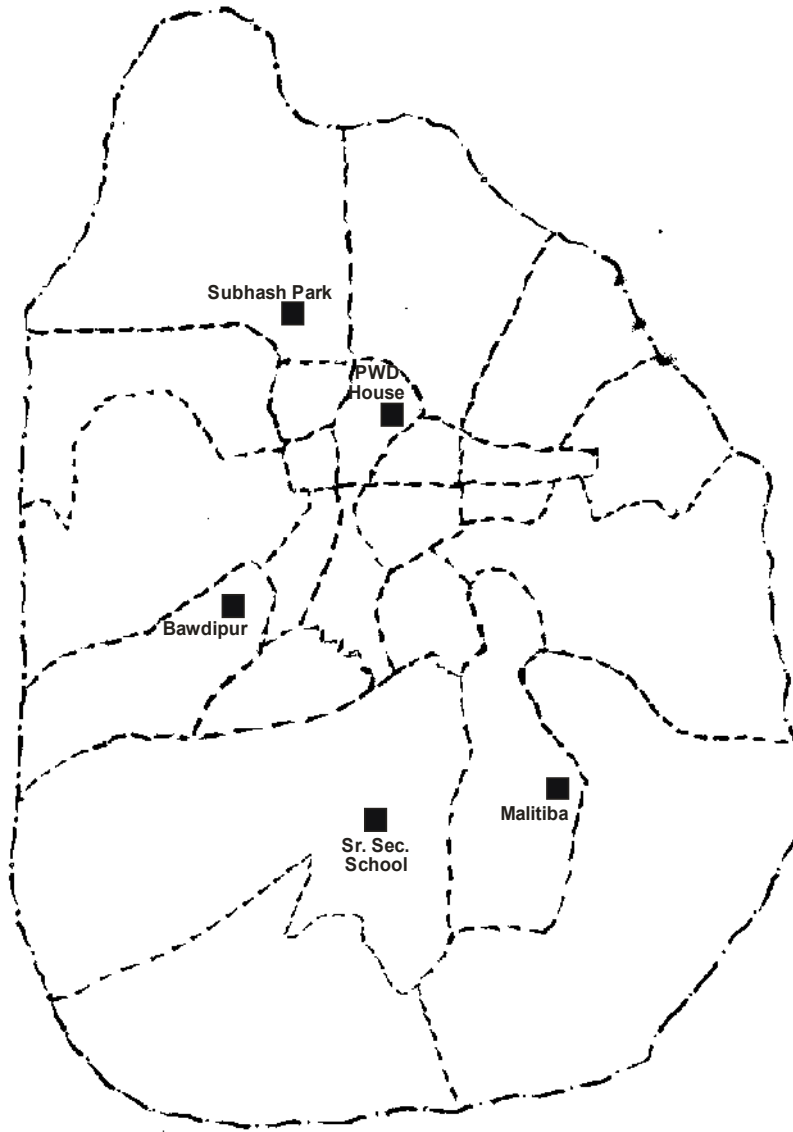
Table 3.7: Storage Capacity and Location of Under Ground Water Storage Tank, Narnaul Town, 2009-10

S. No.	Location	No. of Item	Size	Storage Capacity (Gallons)
1	PWD House of Purani Mandi	3	2 x 69' x 69.3' x 10	3,30,000
			7 x 40' x 70 x 10	1,00,000
2	Sr. Sec. School	2	1 x 27' dia x 5'66"	15,000
			1 x 25 dia x 12'	25,000
3	Mali Tibba	1	1 x 40 x 30 x 10	75,000
4	Bawripur	1	1 x 27 dia x 10	35,000
5	Subash Park	1	1 x 40' x 40' x 6'3"	1,00,000
	Total	8		5,80,000

Source: Public Health Department, Narnaul Town (2009-10)

Table 3.7 shows Narnaul town has stored 5,80,000 gallons water in under ground water storage tanks. Canal water is stored in these tanks after filtration, which is supplied near by wards of the town, because the canal water supply was made effective after 15 days gap. So remaining 15 days the wards get during water from the store underground tanks. Due to irregular supply of water people face many

**NARNAUL TOWN
LOCATION OF UNDER GROUND
WATER STORAGE TANKS
2010**



■ Under Ground Tank



Fig. - 3.8

type of difficulties to fetch water for there daily domestic purposes specially in summer seasons.

Table 3.8 Water Supplies through Tube Wells of Narnaul Town, 2001, 2005 and 2010

Tube well location	2001 Quantity (in gallons)	2005 Quantity (in gallons)	2010 Quantity (in gallons)
Patikra	4,46,000	7,07,000	4,90,000
Kojinda	2,84,000	3,18,000	2,20,000
Mandi	95,000	30,000	Dry
Kadipuri	----	64,000	1,28,000
Rambas	----	64,000	1,02,000
Narnaul	----	96,000	1,16,000
Total	8,25,000	11,83,000	10,56,000

Source: Public Health Department, Narnaul (2009-10)

Table 3.8 records the pattern of water supply through tube wells since 2001 to 2010. The town gets water from near by villages i.e. 8,25,000 gallons water from Patikra, Kojinda and Mandi during in 2001 (Figure 3.7), which has been increased up to 1,18,300 gallons per day from three more tube well install in the villages Kadipuri, Rambas and Narnaul, during 2005. In 2010 the number of tube wells of drinking water is the same but quantity of water has been decreasing due to dry of Mandi tube wells and deficiency of rainfall as well as the decreasing trends in the level of under ground water. So every year decreasing level of under ground water level some tube wells are dry and some have low quantity of water.

Table 3.9: Demand and Supply of Water in Narnaul Town, 2001-2010

Water Consumption	2001	2005	2010
Actual water supply required per	15,00,000	20,00,000	20,00,000

day (In gallons)			
Supplied per day (In gallons)	14,41,000	17,63,000	16,36,000
Demand supply gap (In gallons)	-59,000 (deficit)	-2,37,000 (deficit)	-3,64,000 (deficit)
Actual per capita consumption of water required (LPCD)	110	150	150
Existing per capita consumption (LPCD)	105	80	75
Per capita a consumption gap surplus / deficit (LPCD)	-5 (deficit)	-70 (deficit)	-75 (deficit)

Source: Public Health Department, Narnaul Town, 2010

Table 3.9 highlights that sufficient amount of water was not supplied by the Public Health Department of Narnaul town during 2001 - 2010. Actual demand was 15,00,000 gallons per day in 2001. But the Public Health Department was supplied 14,41,000 gallons per day. This shows deficit of 59,000 gallons per day of drinking water supply. The require supply water is 2, 37000 gallons per day but it supply only 2,00,000 gallons per day. This indicates again the deficit of 3700 gallons per day during 2005-06. Same scenario has also been noted during 2009-10. They requirement of drinking water 20,00,000 gallons per day but the supply quantity is only 16,36,000 gallons per day which again indicates a deficit of 3,64,000 gallons per day. The main reason of decreasing supply water was the decreasing pattern in the level of the under ground water at very fast rate. Many tube wells water level has gone dawn and some of them are dried. Table 3.9 also reveals that the pattern of per capita consumption of water has been decreased by 5 liters, 70 litres and 75 litres per day per capita during 2001, 2005 and 2010. As data shows that the existing per capita consumption was 105 liters per day per capita in 2001 but the actual requirement has been noted as 110 liters per day per capita. This has been by 150 liters per day per capita during 2005. But the supply quantity has been recorded only 80 liters per capita per day. Which again reveals

that, there are deficit of water supply of 70 litres per capita per day and up to 75 litres capita per day during 2010. While it required 150 litres per day per capita. So per capital consumption gap becomes 75 litres per capita per day. Hence it has been seen that there is a huge gap between the demand and supply of water in the town. Which is continued to decline due to decrease ground water table, population growth, urbanization and irregularity of rainfall.

As per the Bureau of Indian Standards (1772-1993), minimum water supply of 200 litres per capita per day (LPCD) should be provided for domestic consumption in the cities with well flushing system. It also mentions that the amount of water supply may be reduced to 135 LPCD for the lower income group and economically weaker section (EWS) of the society and in small town (Modi 1998)¹⁰. Ninth plan (1997-2003) advocated that the requirement of water in urban areas as 125 LPCD in cities with the planned sewerage system and 70 LPCD in cities without planned sewerage system; and 40 LPCD for those collecting water from public posts. However, in the tenth plan (2002-07), the cities with planned sewerage system are classified into two groups based on population, i.e. (i) metropolitan or mega cities and (ii) non-metropolitan cities. In the former the recommended minimum water supply level is 150 LPCD and in the later 135 LPCD (Govt. of India, 1997-2002). Health Department of the town says that they provide 80 LPCD. But through primary survey it was found that the town got approximately 75 LPCD water supply for their domestic purpose. The data at national level which also indicates that amount of water supply in Narnaul town has far less for the consumption of water.

Table 3.10: Prescribed Quantity of Consumption of Drinking Water per Capita per Day, Narnaul Town, 2010

Use	Quantity in LPCD
Drinking	4
Cooking	5
Washing	35
Bathing	20
Toilet	10

¹⁰ Modi P.N. (1998) “Water supply Engineering”, Standard book house, Delhi.

Others	6
Total	80 LPCD

Source: Public Health Department, Narnaul town, 2010

Table 3.10 and figure 3.9 show the prescribed quantity of drinking water consumption per capita per day for different use during 2010 by Public Health Department. According to Public Health Department, the prescribed per capita consumption of water is 80 LPCD. Out of which 35 liters water is use for washing, 20 litre water for bathing, 10 litre for the toilet, 4 litre for the drinking and 5 litre for cooking and 6 liter for other uses by every person everyday in 2010.

A majority of households in Narnaul town depend on Public Health Department (like tap) water supply for their daily needs. The 54th round NSSO data shows that 70.1 per cent households in urban India depend on tap water (Municipal water supply), 21 per cent on the tube wells, and 6.7 per cent on wells/open wells, and the rest on other sources (Bajpai and Bhandari, 2001)¹¹.

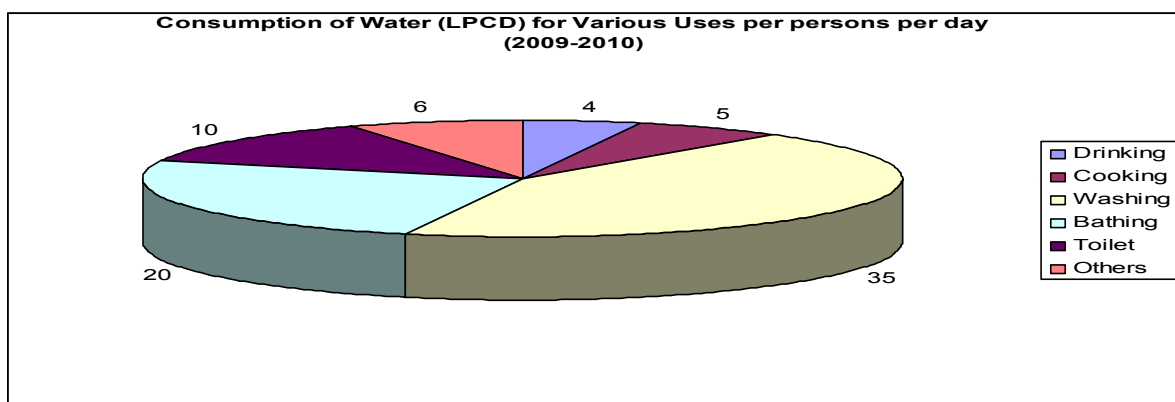


Figure 3.9

However, the present study (table 3.11) shows that out of total 550 households only 274 households (49.82%) depend on tap water supply. The proportion of households using taps water is lower than the 54th round figure of NSSO. Remaining households use the alternate sources for drinking water supply, i.e., private tanker, own source and community source, while the Public Health Department of town is reported that they provide 91% of the households of tap water supply. Another reason is that the duration of supply hours is also found to be irregular. Very few

¹¹ Bajpai P. and Bhandari L. (2001) "Ensuring Access to water in urban households," Economic and political weekly, Sep 29, pp 3774-3778.

households use proper tap water supply. Most of the households of the town face the problem of water supply because of irregularity in the supply of water.

Table 3.11: Dependency of Sample Households on Various Source of Drinking Water Supply, 2010

Sr. No.	Sources	No. of Households	Per centage (%)
1	Tap	274	49.82
2	Tanker	209	38
3	Own source	9	1.64
4	Community source	58	10.54
	Total	550	100

Source: Field Survey, May, 2010

Table 3.11 and figure 3.10 reveal the dependency of sample households on various sources of drinking water supply in Narnaul town during 2009-10. Out of total households 274 (49.82%) households depend on tap water supply, followed by 209 (38%) households which have tap in their house but drinking water could not reach at

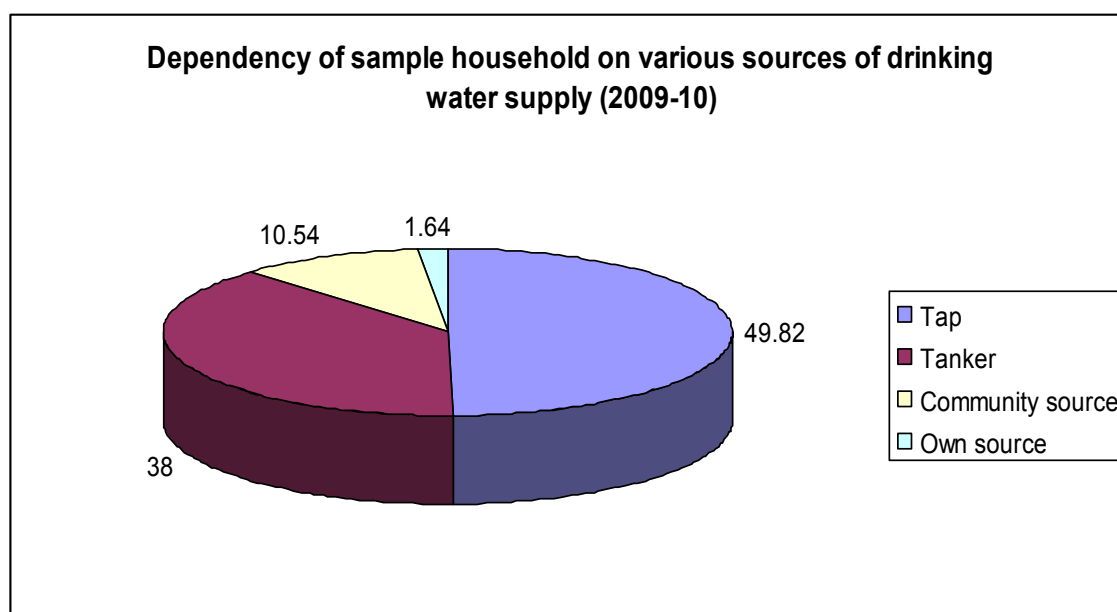


Figure 3.10

their home regularly. So they get water through alternative source of water from the house holds private tanker of the Municipal Corporation and some get from private tanker on their own charges. Only 9 (1.64 %) households depend on their own sources of water supply while 58 (10.54%) households depend on the community sources of water supply. They get water from their neighborhood or from the common water tank or tap available on the road side. It has also been noticed that all wards except 1, 2, 3 most of the households depend on community source of water supply. Some households especially in wards 8, 9, 10, 11 and 12 got drinking water after very hard attempt. Through field survey find out that approximate 50 per cent households get tap water supply, while Public Health Department of the town claim that they provides 90 per cent households of the town.

Table 3.12 shows the water location of boosting stations of Narnaul town 2001-2010. The town has total 4 water boosting stations which are also situated in different

Table 3.12: Location of Boosting Station, Narnaul Town 2001 to 2010

2001-02

Sr. No.	Location of Boosting Station	Size of UGT	No. of UGT	LMP head of Pump	BHP of motor	Discharged Pump in GPH	Capacity in gallons	Run ning hour
1	Moh. Malitibba	40'×30'×10' rectangular	1	800×40m	10.00 (horizontal 3"×2.5")	10000	75000	4
2	Moh. Bawripur	27' i/d circular	1	800×40m	10.00 (mono block pump set)	10000	35000	3

3	Sr. Sec. School	40'×40'×65' rectangular	1	800×40m	10.00 (horizontal pump set)	25000	25000	10
4	Subhash Park	40'×40'×65 rectangular	1	800×40m	10.00 (mono block pump set 4'×2')	10000	75000	10
2005-06								
1	Patikra Village	2×69'.3"×63.3'×10"	3	125×100 mm	50.00 C.F. Pump set	25000 5000	700000 450000	20 hours
2	Patikra Village	1×40'×70'×10'	1	3"	20 C.F. Pump set	10000	70000	7 hours
3	Subhash Park Road	40'×40'×65' rectangular	1	3"	20 C.F. Pump set	12500	62500	5 hrs
4	Sr. Sec. School	27' i/d circular	1	3"	25 C.F. Pump set	20000	180000	9 hrs
5	Bawari pur	27' i/d circular	1	3"	10 mono block pump set	10000	30000	3 hrs
6	Mali Tibba	40'×40'×65' rectangular	1	3"	10 C.P. Pump set	12500	44000	3½ hrs.
2009-10								
1	Mali tibba	40'×80'×10	1	800×45m	20BHP	12000	4000	3 hrs

		rectangular						
2	Bawripur	27' i/d circular	1	1000×44m	15BHP	10000	35000	2 hrs
3	Sr. Sec. School	8.40 m i/d 7.62 m i/d	2	25 BHP 1500×45m	25 BHP 30 PHP	20000	75000	2 hrs
4	Subhash Park	12.20 m × 12.20 m rectangular	1	1200×40m	20BHP	10000	60000	4 hrs

Source: Public Health Department of Narnaul Town, 2010

part of town during 2001-2002. All boosting stations have only single underground water storage tank. Running hour of water supply is also different. The boosting station of Sr. Sec. School and Subhash Park have more running hour of supply water which have 10 hours per day. While the boosting station Mohalla Malitibba and Mohalla Baripur have 3 and 2 hours a day supply respectively.

It has been noticed that the hours of water supply have been increased during 2005-06, the 6 boosting stations which are, situated in Patikra village. Running hour of water supply has also more in Patikra village than other boosting stations, but the old boosting water stations running hour has been decreased because of underground water level gone down very fast rate.

In 2009-10 clear boosting water storage tanks are remain the same as it was during 2005-06 but running hour of water supply has been gone down. The main reason of decreasing running hour is decrease in the level of under ground water. Due to this problem the supply of drinking water is very poor especially in summer season. Most of the town faces scarcity of drinking water.

Status of drinking water supply

Narnaul town has 10,588 households spread over 23 wards. For field survey 550 (5%) sample taken from each ward by taking variables like commercial, industrial establishment. Other public and private institutions are not covered. Data are collected by interviewing method. The survey schedule has designed to elicit information on households characteristics of the sources on which they normally depend for different uses and

actual quantity obtained from particularly tap, private tanker, and community source of water supply. With the help of questionnaire collect all kind of information of water supply at ward level. And also collect information about drinking water quality and effect of unsafe water on human health.

Table 3.13 depicts the different sources of drinking water supply of all sample households. They are public sources like direct pipe line connection in the houses, out

Table 3.13: Distribution of Sample Households get supply water through different sources, Narnaul Town, 2010

S. No.	Sources	Sample households	Per centage (%)
1	Public		
A	Direct in house	274	49.82
B	Outside tap	10	1.82
C	Storage tank	48	8.73
D	Municipal tanker	78	14.18
2	Own source	9	1.64
3	Private tanker	131	23.89
	Total	550	100

Source: Field Survey, May, 2010

side tap, storage tank, and municipal tanker, and some have their own source of water supply. While some people get water supply for their different uses from the private tanker on payment basis. The 54th round NSSO data shows that 70% of the households in Urban India depend on tap water (Municipal water supply), 21.4% of the tube wells, 6.7% of the wells and rest on the other sources (Bajpai and Bhandari 2001). However the present study shows that as 274 (49.82%) households have direct tap water supply in their houses followed by 10 (1.82%) households have public tap which are situated on common places of the town in different wards. Out of 550 sample households in which 48 (8.73%) households got water from the common water storage tank which is situated at different places of the town. While 78 (14.18%) households are depend on the municipal committee tanker, 9 (1.64%) households have their own source of water supply and the remaining 131 (23.89%) households are depending on the private tanker of water supply. Water consumption depends upon several factors including the social and cultural and others like nature of industrial technology used etc. As Burton and Lee have also point out that there are evidences to

show that the demand for residential water supply is a function of accessibility to water housing conditions, the level of income and water using habits.

Table 3.14: Consumption of Drinking Water (LPCD) in Narnaul Town, 2010

Income group (In Rs.)	Drinking	Cooking	Washing	Bathing	Toilet	Others	Total LPCD
< 5000	4	5	18	14	8	1	50
5000 – 10000	5	5	23	17	12	2	62
10000 – 15000	5	5	30	17	14	3	75
> 15000	5	5	40	18	16	3	87

Source: Field Survey, May 2010; Liter per Day Consumption (LPCD)

Table 3.14 also reveals that per day per capita consumption has been increased as income of the people increased. The lowest income group (<Rs. 5000 per month) consumes around 50 LPCD, which have been increased around 87 LPCD in Rs. 15000 + group. This reflects the fact that higher income groups consume more water for washing, bathing and toilets than the lower income group but lower income group people consume more water for drinking than the other purposes. While Public Health Department of Narnaul town has estimated that per capita consumption is 80 litre per day per person for their various uses like washing, bathing, toilet, cooking drinking. But the data collected through field survey, it has been recorded that per capita consumption of water is not the same as said earlier. It is different in different part of the town due to unequal amount supply of water available for all wards and it is also unevenly distributed. According to norms of urban water supply the per capita consumption of water should be as follows:

- 40 litres of safe drinking water per capita per day (LPCD) for human beings.
- One hand-pump or stand post for every 250 persons.

- The water source should be available within the habitation/within 16 km in the plains and within 100 metres elevation in the hilly areas.

Table 3.15 Means of Water Supply Households (%) at ward level, Narnaul Town, 2010

Ward No.	Means of water supply				
	Tap	Private	Own	Community	Total
1	60.61	27.27	3.03	9.09	100
2	45.45	31.82	9.09	13.64	100
3	54.54	13.64	9.09	22.73	100
4	56.25	28.12	-	15.63	100
5	34.78	65.22	-	-	100
6	14.56	11.44	-	-	100
7	39.13	60.87	-	-	100
8	52.17	30.43	-	17.39	100
9	54.54	22.73	-	22.73	100
10	45.46	12.12	-	42.42	100
11	51.85	33.33	-	14.81	100
12	50	38.46	-	15.54	100
13	65	35	-	-	100
14	15	70	-	15	100
15	63.64	36.36	-	-	100
16	66.67	33.33	-	-	100
17	47.37	52.63	-	-	100
18	61.90	38.10	-	-	100
19	57.14	42.86	-	-	100
20	59.09	40.91	-	-	100
21	40	52	-	8	100
22	33.33	50	-	16.67	100
23	28.57	38.09	19.05	14.29	100
Total	49.82	38	1.64	10.54	100

Source: Field survey, May 2010

But there is no such type of drinking water supply norms. The condition of drinking water is worse which will create very big problem. Table 3.15 shows the different means of drinking water supply at ward level. Out of 550 sample households (Primary survey) almost 50 per cent sample households i.e. 274 (49.8%) depend on tap water supply but there is also one of the interesting point is that those households who have tap water connection could not get one or two days. They get water from private tanker and municipal water supply tankers. Wards 5,7, 14, 21, 22, 23 depend on private tanker because drinking water supply come after a gap of two or three days. It has been noted that there are 3.03 per cent households have their own hand pumps followed by 4.09 per cent households in ward 3 and 19.65 per cent households in ward 23. In ward 1 have 3.03 per cent households ward have 9.09 per cent households, ward 3 have also 9.09 per cent households and 23 ward have 19.05 per cent households who have their own . The remaining wards 5, 6, 7, 15, 16, 17, 18, 19, 20 get water from community water storage tank. In which most of them depend on public source in ward number 10. The main reason is that these are most Scheduled Caste population. They are economically poor people who could not get any alternate source of water supply. So dependency of most of the household has public source of water supply. While through field survey find that most of the households have face many kind of problems to fetch water for their domestic purposes. So the condition of water supply is worse for future prospect. Another thing is that town has only two sources of water supply in which canal water is irregular source.

Figure 3.11 shows the distribution of means of drinking water supply at ward level of the town. Figure 3.11 (a) shows the distribution of tap water supply. The lowest (<50 %) households get water from the tap in the wards 2, 5, 6, 7, 10, 14, 17, 21, 22 and 23. The main reason is that ward 22 and 23 are the newly constructed wards of the town. The tap water supply is not covered these wards properly and the remaining wards have old pipe of water supply and these pipe lines are poorly maintained. The medium (50-60%) households which get tap water supply the wards 3, 4, 8, 9, 11, 12, 13, 19 and 20. The high category of (>60%) households get tap water supply in the wards 1, 15, 16 and 18. The main reason is that ward no 1 is converted into a sector so water supply is done.

NARNAUL TOWN DISTRIBUTION OF MEANS OF WATER SUPPLY 2010

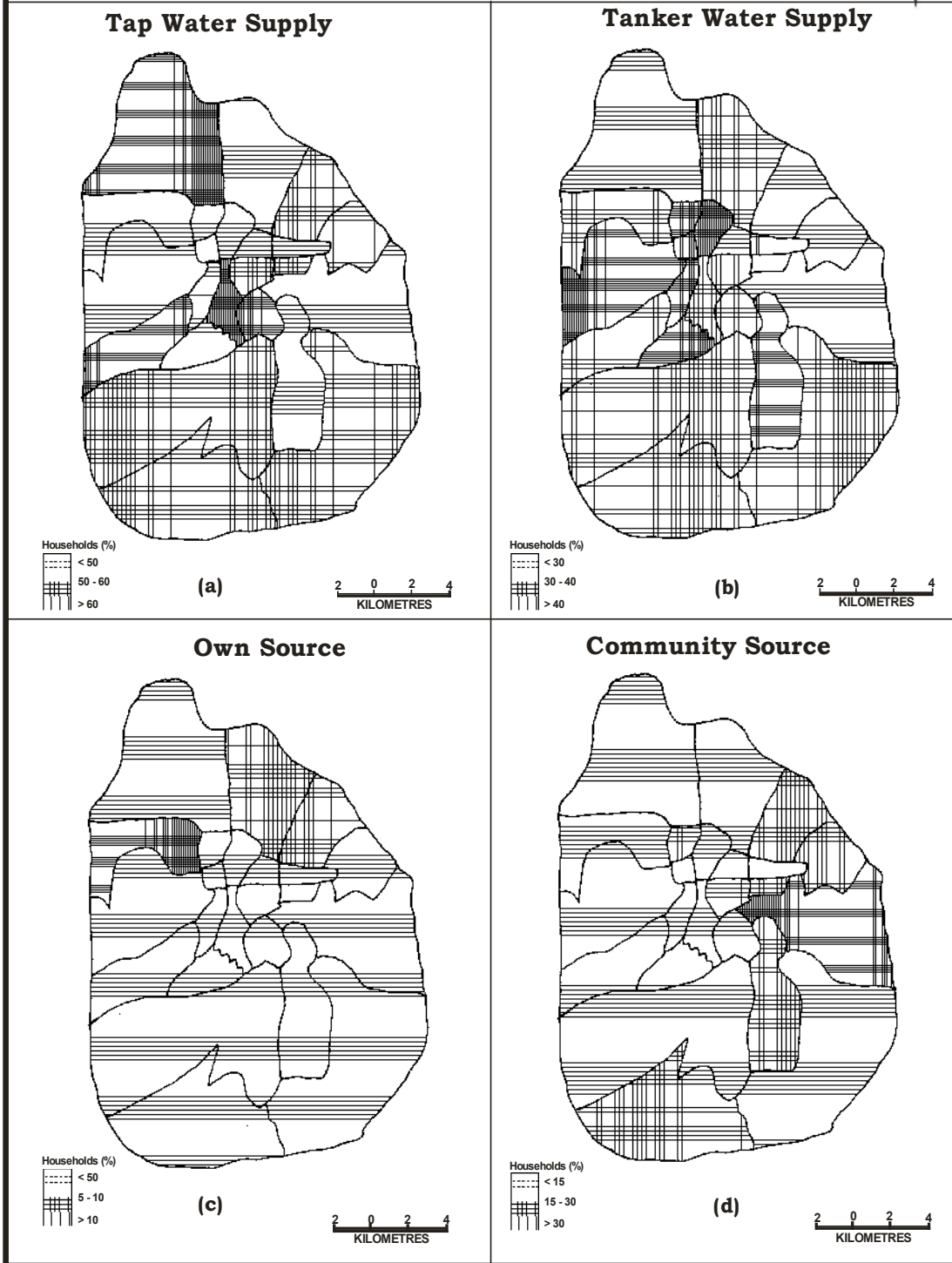


Fig. - 3.11

by urban development authority and wards 15, 16 and 18 are being a center part of the town they get high amount of water supply.

Figure 3.11 (b) shows the distribution of households which get drinking water from tanker at ward level. The lowest (30%) households which depend on tanker water supply are noted in the wards 1, 3, 4, 6, 9, 10. The main reason is that these wards have better tap water supply than the other wards. The medium category (30-40%) household gate water is found in the wards 2, 8, 11, 12, 13, 15, 16, 18 and 23. The high category (>40%) households which depend on tanker water supply on their own payment basis found in the wards 5, 7, 14, 17, 19, 20, 21 and 22 not reach regularly to these wards.

Figure 3.11 (c) shows the distribution of own source of drinking water supply at ward level. The lowest category (<5%) households which have own source of drinking water supply are found in most of the wards like 1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22. The main reason is that these wards depend on tap water supply. The medium (5-10%) households which have their own source of water supply is noted in the wards 2 and 3. The highest category (>10%) households which have their own source of water supply is noted only in one ward because this ward is newly constructed and tap water supply is not reach properly.

Figure 3.11 (d) shows the distribution of households which depend on community of water supply. The lowest category (<15%) households is noted in the wards 1, 2, 5, 6, 7, 11, 13, 15, 16, 17, 18, 19, 20, 21 and 23. The main reason of lowest dependency on community source is that most of the wards are depend on the tap water supply. The medium category (15-30%) households which depend on community sources found in the wards 3, 4, 8, 9, 12, 14 and 22. The highest category (>30%) households has only one ward 10 because this ward is belong to scheduled caste and population of this ward is also high but the coverage of tap water is poor.

Table 3.16 shows the dependency of different income group with different source of water supply. Those households who have monthly income Rs. 5000 or less, they get water from the direct tap. As table 3.16 indicates that 67 (54.92%) households get water

Table 3.16: Distribution of Households (by income group) Use of Drinking Water through Various Sources, 2010

Income group (In Rs.)	Tap	Tanker	Own source	Community Source
< 5000	67 (54.92%)	21 (17.21%)	1 (0.82%)	33 (27.05%)
5000 – 10000	104 (55.61%)	62 (33.15%)	1 (.53%)	20 (10.69%)
10000 – 15000	72 (41.62%)	93 (53.76%)	4 (2.31%)	4 (2.71%)
> 15000	31 (45.59%)	33 (48.53%)	3 (4.41%)	1 (1.47%)
Total	274 (41.82%)	209 (38%)	9 (1.64%)	58 (10.54%)

Source: Field Survey, May 2010

from direct tap, 21 (17.21%) households from municipal committee tanker, only one (.82%) households get water from their own source and 33 (27.05%) households get water from the community source of water supply which is highest in all income groups. Those households have income groups Rs. 5,000-10,000 per month get water from the tap water supply and different sources. For example, 104 (55.61%) households depend on the tap water supply, followed by 62 (33.15%) households get water through tanker, 20 (10.69%) households get water from the community source and only one (.53%) household has his own source. Those households have income group Rs. 10,000-15,000 maximum number of households depend on the tanker water supply, because tap water supply come after a gap of two or three alternate days. There are 72 (41.62%) households depend on the tap water supply, 4 (2.31%) households have their own source of water supply and 4 (2.31%) households got water from the nearest community source of water supply. Those house holds have income more than Rs. 15,000, maximum number of households depends on tanker water supply, 31 (45.59%) households have tap water supply, 3 (4.41%) households have their own source of water supply and only one (1.47%) households is depend on community source. There is an interesting observation **Table 3.17 Distribution of Households (%) for Water Consumption Category Wise in the Town, 2010**

Ward No.	Per capita consumption (LPCD)				
	< 50	50-60	60-70	Above 70	Total

1	9.09	12.12	36.36	42.42	100
2	9.09	13.64	22.73	54.54	100
3	18.18	27.27	45.46	9.09	100
4	25	28.13	34.37	12.5	100
5	26.09	26.09	40.43	17.39	100
6	40	28	20	12	100
7	39.13	34.78	26.09	0	100
8	56.52	34.78	8.69	0	100
9	54.55	36.36	29.09	0	100
10	48.49	36.36	15.15	0	100
11	48.15	37.04	14.81	0	100
12	42.31	46.15	15.54	0	100
13	45	50	5	0	100
14	65	35	0	0	100
15	18.18	54.55	27.27	0	100
16	20.83	54.17	25	0	100
17	26.32	73.68	0	0	100
18	14.29	51.90	19.05	14.76	100
19	14.29	52.38	23.81	29.52	100
20	36.36	40.91	22.73	0	100
21	28	52	12	8	100
22	16.67	54.17	12.5	16.67	100
23	28.57	68.67	4.76	0	100
Total	31.64	40.36	19.27	8.73	100

Source: Field survey, May 2010

that those house holds have income Rs. 10,000-15,000 and more than Rs. 15,000 per month households get water from the tap and tanker, very few of them get water from community source of water supply. They have their own sources of water supply, while lower income group households have often used community source of water supply.

From the table 3.17 it is evident that the ward wise per capita per day consumption of drinking water supply in the town is very small proportion of households which consumed water above 70 LPCD. Only 8.73 per cent households get water above 70 LPCD. There are wide variations to the proportion of households in different ward which are consuming water above 70 LPCD. Most of the ward gets 50 to 60 LPCD water but ward 6-14 almost get less than 50 LPCD. It is very obvious from the above table that in all ward of the town, the consumption of water per capita is much lower than what is recommended of the Bureau of Indian standard is 1722-1933 and the tenth five year plan. In the wards 1 and 2 have 42 per cent and 55 per cent households get above 70 LPCD water for their domestic consumption. Because ward number 1 almost a part of HUDA Sector in which almost officer lived, so supply of water is good. But wards 8, 9, 10, 11 and 12 have very poor supply of water or most of households get less than 50 LPCD. The main reason is that most of the people belong to the Scheduled Caste and their economic condition is also not better than other wards. The wards 13, 14, 15, 16 have also get less than 50 LPCD or 60 LPCD. The main reason of these problem is that there sufficient amount of water could not reach daily due to low pressure and these wards are situated on the Upper part (Hill area). Through field survey find that very few households got ore then 70 lpcd water daily while Public Health Department of the town claimed that they provide 80 lpcd daily for each ward of the town. Table 3.17 shows that most of the households get 50-60 lpcd water daily.

The wards 16, 17, 18 also face such problem being a central part of the town. The pipe line is very old and not properly maintained. The remaining wards 21, 22, 23 have not proper and good supply of water in the town since 2001. Besides having the highest level of water consumption in the whole wards of the town they have wide variation in consumption of water per capita which is followed by 1, 2, 3 and 23 wards, seems to be worse. There is only 23 ward in which, a very small proportion of 8.73% households consume water above 80 LPCD.

Figure 3.12 shows the distribution of per capita per day (LPCD) consumption of drinking water supply of the town. Fig. 3.12 (a) shows the distribution of households, those get 50 LPCD. The lowest category (<30%) households recorded in the wards 6, 14 and 23 because most of them have good water supply. The medium category (30-60%) households who get less then 50 LPCD are noted in the wards 2, 3, 4, 5, 7, 8, 9, 10, 11, 12. The highest category (>60%) households have wards 1,13,15,16 and 18. The main reason is that there is no better source of water supply.

Figure 3.12 (b) shows the distribution of households which get 50-60 LPCD supply of water. The lowest category (<30%) households get water is recorded in the wards 1, 2, 3, 4, 5, 6. The main reason is that wards 1 and 2 most of the households get more than 70 LPCD water and wards; 3, 5 and 6 get 60-70 LPCD water. The medium category (30-60%) households who get 60-70 LPCD water is noted in the wards 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21 and 22 wards. The highest category (>60%) households who get the same amount of water is recorded in the ward 17 and 23 because ward 17 is being a central area of the town where pipe line is old and poorly maintained and the ward 23 is newly constructed ward where pipe line is not properly covered.

Figure 3.12 (c) shows the distribution of households which get 60-70 LPCD water from tap water supply. The lowest category (<20%) households of this category is noted wards 8, 10, 12, 13, 14, 17, 18, 22 and 23. The main reason is that supply of drinking water is not good in these wards. Almost all wards get water less than 60 LPCD. The wards 1, 2, 4, 6, 7, 9, 15, 16, 19, 20 and 21 are belonging to the medium category (20-40%) households. The remaining wards 3 and 5 come under the highest category (>40%) households in which they get water from alternate source like private tankers.

Figure 3.12 (d) shows the distribution of households which get water more than 70 LPCD water supplies daily. The lowest (<20%) households of this category is noted with wards 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22 and 23 because of irregular supply of tap water supply and it's unevenly distribution. The ward 19 belongs

**NARNAUL TOWN
DISTRIBUTION OF PER CAPITA PER DAY (LPCD)
CONSUMPTION OF DRINKING WATER SUPPLY
2010**



Consumption less than 50 LPCD

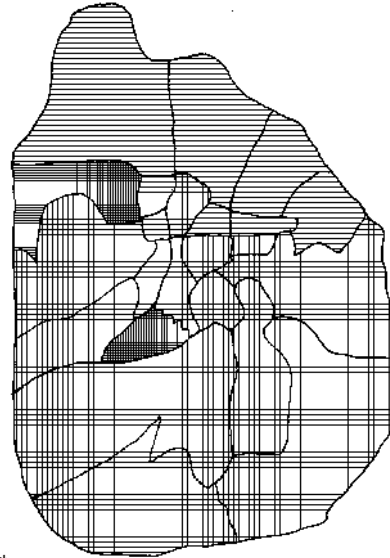


Household (%)
 < 30
 - - - - 30 - 60
 # # # # > 60

(a)



Consumption 50-60 LPCD

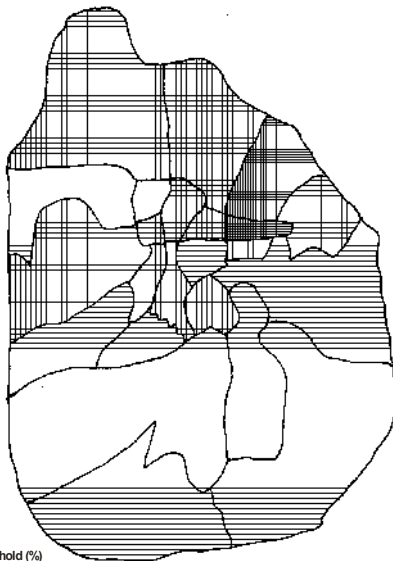


Household (%)
 < 30
 - - - - 30 - 60
 # # # # > 60

(b)



Consumption 60-70 LPCD

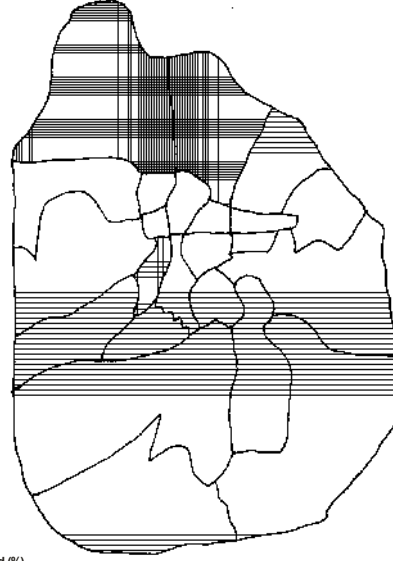


Household (%)
 < 20
 - - - - 20 - 40
 # # # # > 40

(c)



Consumption more than 70 LPCD



Household (%)
 < 20
 - - - - 20 - 40
 # # # # > 40

(d)



Fig. - 3.12

Table 3.18, Distribution of Households (%) Tap Water Supply, Narnaul town, 2010

Ward No.	For few	Once time in	Once in	Once in	Cannot say	Total
1	42.42	39.39	12.12	6.06	0	100
2	68.18	18.18	13.64	0	0	100
3	0	31.82	45.45	22.73	0	100
4	9.37	59.37	18.75	12.51	0	100
5	17.37	43.48	26.09	13.04	0	100
6	0	40	28	32	0	100
7	0	52.17	30.44	17.39	0	100
8	0	43.48	47.83	8.69	0	100
9	0	0	31.82	59.09	9.09	100
10	0	18.18	30.30	36.36	15.15	100
11	0	14.81	44.44	33.33	7.41	100
12	0	19.23	34.61	26.92	19.23	100
13	0	0	25	30	45	100
14	0	0	35	40	25	100
15	0	27.27	13.64	50	9.09	100
16	0	0	29.17	37.50	33.33	100
17	0	0	21.05	31.58	47.37	100
18	0	9.52	28.57	33.33	28.57	100
19	0	19.05	14.28	23.81	42.86	100
20	0	27.27	18.18	22.73	31.82	100
21	12	16	32	24	26	100
22	16.67	8.33	16.67	29.12	19.11	100
23	0	14.28	23.81	38.09	23.81	100
Total	7.82	23.09	26.91	26.73	15.45	100

Source: Field survey, May 2010

to medium (20-40%) category households who get >70 LPCD water daily. The highest category (>40%) households who get water more than 70 LPCD is recorded in the wards 1 and 2. The main reason is that most of the part of ward 1 is converting into sector area where water supply is maintained by urban development authority and ward 2 is known as officer colony where 1st class officer lived so they also get good amount of water supply.

Table 3.18 shows the availability of tap water supply in Narnaul town. The safe drinking water in urban areas is not only a burning issue; the supply is also very erratic and done for a limited duration. As the supply of tap water is highly erratic and for a very limited duration, the households try to store water in their tanks.

According to field survey data near about 7.82% households who have reported that they are using public tap water supply. It is available for 2 hours twice a day and 26.91 per cent households have reported that they get water only one time in a day respectively. About 26.73 per cent households have town reported that water comes from the tap for a few hours in a gap of two days. While 15.45 per cent households responds cannot say anything about supply. So it shows that there is a wide variation in the supply of water in the whole wards of the town. So most of the households collect water from another sources like private tanker on their own charges, community source etc. While Public Health Department of the town reports that they cover 90 per cent households with tap water supply. But the field survey data gives the right picture of the pitiable condition of water supply in the town which is a matter of serious concern. So table shows that supply of drinking water for the town is irregular due to old and poorly maintained pipe lines of the town. Without proper maintenance water could not be reached all parts of the town. Another problem is that quantity of water is also low. So drinking water supply in the town is unevenly distributed

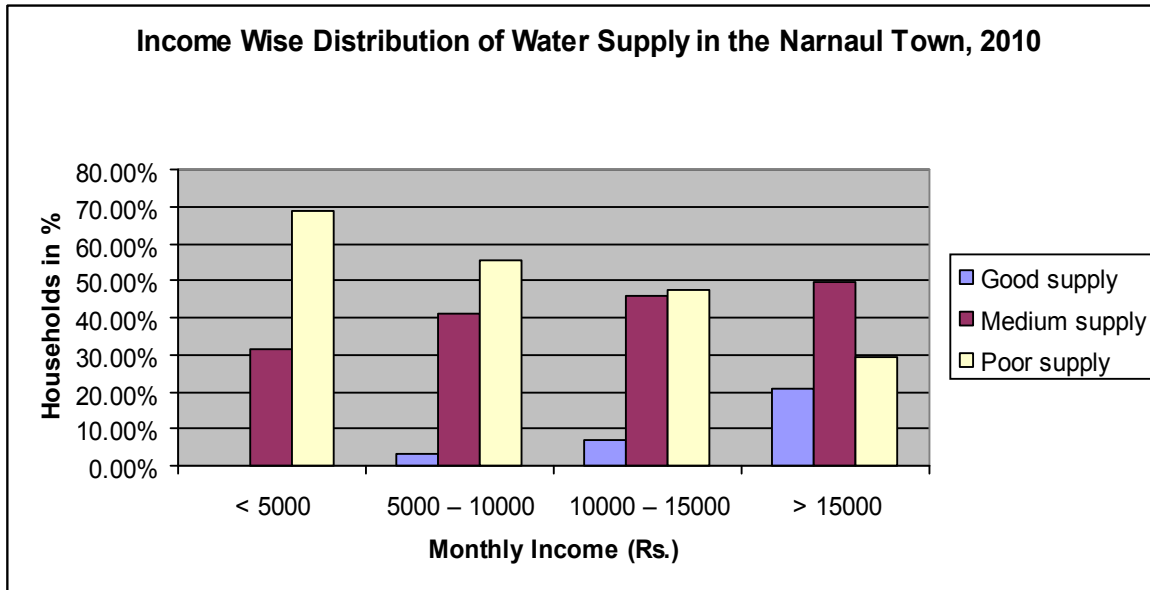
Table 3.19 and figure 3.13 reveal average income group wise distribution of sample households by extent of public water supply. Based on the level of water supply, it is divided into three categories, i.e., (i) good level of water supply (>80 LPCD). (ii), medium level of water supply (60-80 LPCD) (iii) low level of supply (<60 LPCD).

Table 3.19: Average Income group wise distribution of Sample Households by Extent of Public Drinking Water, Narnaul Town, 2010

Different Income levels	< 5000	5000 – 10000	10000 – 15000	> 15000	Total no of households
Good supply (>80 LPCD)	---- (0.0%)	6 (3.39%)	10 (6.94%)	20 (21.05%)	36 (6.55%)
Medium supply (60-80 LPCD)	42 (31.34%)	73 (41.24%)	66 (45.83%)	47 (49.47%)	228 (41.45%)
Poor supply (<60 LPCD)	92 (68.66%)	98 (55.37%)	68 (47.22%)	28 (29.47%)	286 (52%)
Total	134 (100%)	177 (100%)	144 (100%)	95 (100%)	550 (100%)

Source: Field Survey, May, 2010

Based on the level of income; low income group households have not good amount of water supply in 42 (31.34%) households and 92 (68.66%) households have poor supply of drinking water. It has also been recorded that those households whose income is less than Rs. 5000/- per month, they did not get good amount of water supply. There are 42 (31.34%) households who get medium amount of water supply and the remaining 92 (68.66%) households get poor amount of water supply. Those households whose income lies in the group of Rs. 5000 – 10000 per month, they also get less amount of water. There are very few households i.e. 6 (3.39%) who got good amount of water supply, followed by 73 (41.24%) households got medium amount of supply of water and 98 (55.37%) households have also poor supply of drinking water. Those households whose income group lies in the group of Rs. 10,000 – 15,000 per month, they do not have better situation. Only 10 (6.94%) households have got good water supply followed by 66



Figure

3.13

(45.83%) households medium water supply and 68 (47.22%) households have got poor amount of drinking water. Those households whose income is more than Rs. 15000 per month, they have better situation than that of other income groups. In this case 20 (21.05%) households got good amount of water supply followed by 47 (49.47%) households have medium amount of supply of water and 28 (29.47%) households have also poor amount of supply of drinking water. Overall result reveals that Narnaul town has no better situation of water supply. Out of 550 households only 36 (6.55%) households have got better situation of water supply, 228 (41.45%) households have medium supply of drinking water supply of all income groups. While the maximum number of 286 (52%) households of all income groups have poor supply of drinking water.

The analysis of drinking water supply of Narnaul town highlights that there is not good arrangement of water supply in almost all wards. There is no regular water supply particularly in wards 10, 11, 12, 13, 14. The storage capacity of drinking water in each household is approximately 500 liters to 1000 litres. Some houses have constructed under ground cemented tank which have 20,000 liters storage capacity. Most of them pay water supply charges Rs. 25/- per month. Those houses situated in HUDA, sector-1 and ward No. 1 have water meter system in their houses and they pay water supply charges according to their use. The situation of drinking water supply is good only in this sector. Another important thing is that only this sector has 2 shift of water supply, i.e., 2 hours in morning and 2 hours in evening. Some houses of ward 2 have better

position of water supply where officers are inhabited. In this colony almost high income group and govt. employee basically 1st class officer's inhabited. It has also been found that 77 per cent households got less than 80 LPCD of water as against minimum supply norms of 135 LPCD. The data related to supply of water indicates that only 11 per cent households of the town received water daily while 35 per cent households received water once in two days and 54 per cent households once in two or more than that days.

With the existing management of water supply in Narnaul town, there is a need to provide more quantity of water through privatization of water supply which can be one way to improve efficiency of water supply. More importantly all water users must be encouraged to follow sustainable techniques such as water harvesting to increase quantity and better quality of potable water. Over all it may be observed that water supply has no proper management in the town. So Public Health Department, Municipal Committee and State Govt. should be improved the quality and quantity of existing sources of water supply for sustainable development of the town. The Government should also be provided hand pump and other facility and help the poor people who cannot afford cost of installing of these sources of water supply.

It may be concluded that there is neither good arrangement, nor regular water supply almost in all wards. For example there is no regular water supply particularly in the wards 10, 11, 12, 13 and 14. Most of them pay extra amount water supply charges i.e. Rs. 25 per month. Those houses are located in the ward 1, i.e. HUDA Sector 1 paid charges on the basis of water meter reading and they got water supply in two shifts, i.e. 2 hours in morning and 2 hours in the evening. Some houses where officers, government employees and high income group people are inhabited, they have good amount of water supply. Hence, it may be said that the existing management of water supply is not satisfactory in Narnaul town. There is a need to provide more quantity of water through private agencies which may be one way to improve efficiency of water supply. It would be more important that all households must be encouraged to save water through minimum use and follow sustainable techniques such as water harvesting etc.