

Role of Efficiency & Equity as Indicator of Urban Governance in Urban Management: A Case Study of Patna City, Bihar (Selected service & zones)

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Abstract

Original Research Article

This study focuses on importance of efficiency and equity in delivery of water supply service in NCC zone and Bankipore zone along with financial management by Patna Municipal Corporation (PMC). Besides, a comparative analysis has been documented for both zones with respect to accessing water supply service. Since efficiency and equity are two main indicators of urban governance and level of both indicators determine the intensity of urban governance enjoying by urban people for better city management. So, in this study an attempt has been made to determine the level of efficiency and equity and performance by urban local body in providing the services to the people residing in study area.

Keywords: Urban Governance, Efficiency, Equity, Urban Management, Water supply.

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INTRODUCTION

Urban governance is not only the result of proper implementation of only one indicator but also it is achieved as result of proper execution of all or many of them in holistic manner [1]. Apart from participation, efficiency and equity are two most important pillars that support for enjoying the better urban governance resulting into delivery of quality services in the city [2]. Efficiency and equity have been selected as criteria in this study to evaluate the quality of urban governance in the operation of water supply as a basic civic service. Since efficiency of urban governance along with equity is fundamental challenge in urban management and its development characterized by sustainability, subsidiarity, equity, transparency & accountability, civic management and citizenship and security [3]. Cities need to be governed efficiently and effectively to promote a sustainable and conducive environment as a place of work & living. The concept of efficiency in the context of good governance covers the sustainable use of natural resources as well as optimum utilization of basic services without exerting adverse effect. Efficiency is the one of the components of urban management taking account of all interests in promoting efficiency and better services as well as collaboration and partnerships rather than competition and appropriate training to improve capacity of city officials [4]. Efficiency in delivering of urban services

reduces cost of corruption and negative impacts through waste and misuse of resources. It increases public support for difficult choices and sense of fairness in distribution of benefits. Also it increases effective collection of revenues, capacity to borrow at lower rates and increases public support for allocating resources to priorities and support for expenditure on environmental protection and reduces efforts to evade taxes and fees. Efficiency in urban governance is about raising productivity and enhancing value for money. Efficiency gains are achieved by reducing inputs & prices for same outputs, getting greater outputs or improved quality for same inputs or getting proportionally more outputs or improved quality of urban services in return for an increase in resource [5]. It ensures that the resources available to local government are used in the optimum way to deliver better public services according to local priorities. Another important criterion of urban governance is equity that leads to equal accessibilities of urban basic services and equal participation of all urban citizens in decision making process. The sharing of power leads to equity in the access to and use of resources. It has the connotation of inclusive city provide everyone be it the poor, the young or older persons, elite or marginalized people of urban area with equitable access to nutrition, education, employment and livelihood, healthcare, shelter, safe drinking water, sanitation and other basic services [6].

As two important indicators that imply if a suitable level of efficiency and equity maintained in the performance of tasks, it is possible for urban local government to achieve better level of governance. Considering this argument an attempt has been made to analyse & access the level of efficiency and equity in delivery of drinking water supply for determining the urban governance quality in Patna city as general and National capital circle zone (NCC) and Bankipore zone as particular. Efficiency in this study is examined in respect of water supply service management and financial practice conducted by urban local government in operation and maintenance of water supply. Criteria equity has been analyzed in respect of the perceptions of councilors on the level of services available at the ward level as well as their opinion on the existing deficiencies in-service levels.

Study Area

Patna is located between latitude: 25° 37' North and longitude: 85° 12' east, and lies on the south bank of the Ganga River. Patna has a very long river line, and it is surrounded on three sides by rivers—Ganga, Sone, and Poon pun. Just to the north of Patna the river Ganga flows into the river Gandak making it a unique place having four largish rivers in its vicinity. The bridge over the river Ganga, named after Mohandas Gandhi, is 5850 m long is said to be the longest single river bridge in the world.

The temperature of Patna varies from 43 °C – 30 °C during the summers and 21.4 °C – 5 °C during the winters. The precipitation in Patna is 1,100 mm during the months of June to September. It receives medium to heavy rainfall in the monsoon. Relative humidity can go up to 100% during summer [9].

Administratively Patna city has been divided into four zones i.e., NCC zone, Bankipore Zone, Kankarbagh, Patna city, in order to maintain better and effective governance and smooth functioning of local government machinery. The wards fall in two zones namely NCC zone, Bankipore zone have been taken into consideration as study area for analysing the level of governance in city as whole and have done comparative study between two zones in terms of level of urban governance. NCC zone comprising of ward number 1 to 28 and 37 is largest zone in terms of area and population while Bankipore zone consisting of 12 wards (ward number 36, 38, 39, 40 to 43, 47 to 51) bearing smallest area in the city [7]. NCC zone covered western part of city with 49.69 Km² and 5.56 lakh populations where as Bankipore zone situating northern part and covering 8.61 Km² with population of 2.3 lakh [8]. Former on northern and western side is bounded by Ganga River and Sone canal respectively and later bounded by Ganga River on northern side (Figure 1).

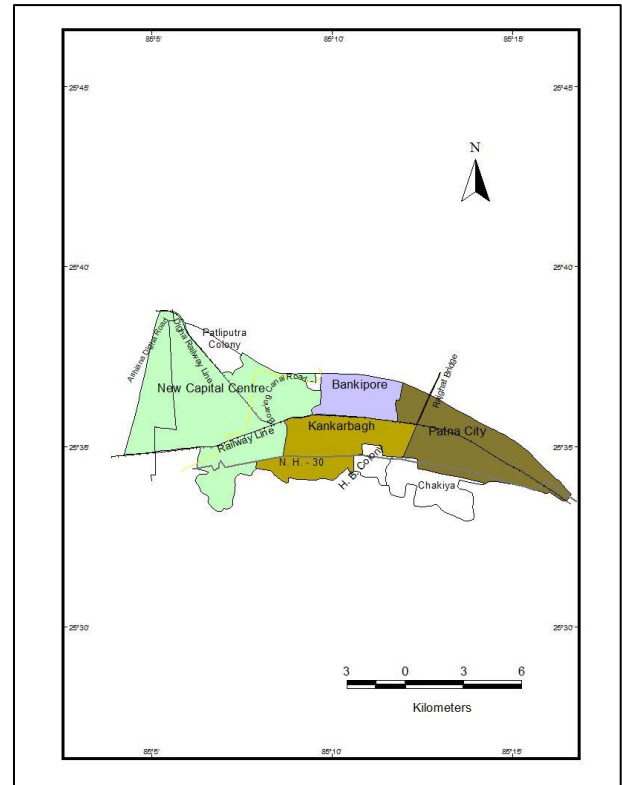


Fig-1: Location Map of Study Area

MATERIALS AND METHODS

Data for this study is collected from various secondary and primary sources and by direct observation. Secondary data has been collected from Directorate of Local bodies, Bihar Rajya Jal Parishad, Urban Local Government, Water Supply Branch of Patna Municipal Corporation (PMC), Patna Regional Development Agency, District Election Office, City Development Plan, District Gazetteers and Census Atlas of Bihar.

In order to generate primary data sampling households have been taken on the basis of stratified random sampling. To generate data from primary sources, various types of surveys have been conducted. (i) Interview with actors engaged in governance of water supply service to examine the participation of actors their role and performance, co-ordination among them and their constraints in respect of civic services. Those actors identified for this survey are appointed authorities and elected members associated with the urban local government, Municipal staff engaged in water supply service and accounts related activities, personnel employed in autonomous organization e.g.- Bihar Rajya Jal Parishada. (ii) Survey of urban local government institutions to assess their performance on various management and financial aspects and constraints in the operation of services. (iii) Interview with elected ward representatives who gave the information relating to knowledge on social, economic and political aspects, level of development etc.

A representative sample of councilors has been selected on the basis of gender (M/F), elected status (general/reserved), their association with local politics (newly elected/reelected), location of ward (planned/ unplanned/ old/ new/ core/ fringe), type of locality (low/ middle/ high income), party to which they belong.

RESULTS AND DISCUSSION

Management Practice in Urban basic service delivery

Management practice in service delivery lies with the responsibility of urban local government. Chief Municipal Officer is the main authority to supervise the execution of all works in the Patna city. Other urban local representatives are required to assist and making rule and regulation in respect of delivery of urban civic services. Patna Municipal Corporation, from time to time, constitutes subject committees consisting of councilors to deal with water supply, drainage and sewerage. Efficiency in Urban governance in providing

of urban services is also determined by the human resource. If any deficiency occurs in this regard it adversely affects the efficiency resulting into the quality of urban governance deteriorated. Further efficiency in this regard has been examined in the respect of water supply.

Personnel Engaged in Water Supply Service

In water supply sector drinking water supply is maintained and operated by water branch of Patna Municipal Corporation which is headed by Chief Engineer. Chief Engineer is assisted by 1 assistant engineer, one junior engineer, 155 Karamcharis. Another department that is establishment section and account section responsible for construction and repair of required instrument and building along with maintaining account. It is headed by executive officer who is supported by 2 assistant accountants and 3 assistants. Total 262 personnel have been engaged in providing of drinking water to households in the city (Table -1).

Table-1: Analysis of Efficiency of Municipal Personnel Engaged in Water Supply

Personnel	Required (100%)	Engaged	Backlog
Executive Officer	1	1 (100%)	0 (0%)
Chief Engineer	1	1 (100%)	0 (0%)
Asst. Engineer (Civil)	4	0 (0%)	4 (100%)
Junior Engineer (Civil)	4	0 (0%)	4 (100%)
Asst. Engineer (Mech.)	1	1 (100%)	0 (0%)
Junior Engineer (Mech.)	1	1 (100%)	0 (0%)
Supervisor	1	0 (0%)	1 (100%)
Accountant	1	0 (0%)	1 (100%)
Assistant Accountant	8	2 (25%)	6 (75%)
Head Assistant	1	0 (0%)	1 (100%)
Assistant	13	3 (23%)	10 (77%)
Store Keeper	1	0 (0%)	1 (100%)
Asst. Store Keeper	1	0 (0%)	1 (100%)
Tax Collector	3	2 (67%)	1 (33%)
Pipe Line Inspector	5	0 (0%)	5 (100%)
Tap Inspector	4	2 (50%)	2 (50%)
Meter Reader	4	1 (25%)	3 (75%)
Pipe Line Mechanic	24	20 (83%)	4 (17%)
Work Shop Mechanic	1	0 (0%)	1 (100%)
Pipe Line Khalasi	68	29 (43%)	39 (57%)
Black Smith	1	1 (100%)	0 (0%)
Pump Driver	100	101	—
Total Worker	447	262 (59%)	185 (41%)

Source – Water Supply Branch, Patna Municipal Corporation, 2010

Delivery of Drinking Water

Under this section delivery of urban basic service have been taken as drinking water supply, made by municipal personnel and other stake holders, to the population living in the town are described.

The drinking water is mined from underground by the concerned authorities. There is no practice to extract the surface water for drinking purpose even though around the city a huge volume of surface water

is available. Water is extracted from underground through different pumping stations situated in various parts of study area. The mechanism applied for purification of ground water is chlorination available in all the pumping stations of NCC and Bankipore zone. Since NCC zone covering large area of city and having more population the number of working tube well are more i.e., 40. Presently another eight tube wells are closed down and not functioning well due to lack of extension of network, failure of transformer, motor and

pump, out of which one is totally dead. Out of 40 working tube wells 31 tube wells are owned by Patna Municipal Corporation and 9 by Bihar Raj Jal Parishad in newly developed colonies of NCC zone (Table- 2).

While Bankipore zone have only 19 working tube wells to supply drinking water to people living in these areas. Another two tube wells are closed due to same reason (Fig. -2). For better supply of drinking water PMC area has been mechanically divided into eight head works out of which three fall under the NCC zone and two in Bankipore zone (Table-2). For civil work purpose it has been divided into seven distribution networks out of which three networks fall in NCC zone and one in Bankipore zone for better maintenance and operation of pipe line. About 134 million liter per day (MLD) water is produced for supply of drinking water in NCC Zone while in Bankipore zone only 68 MLD produced daily (Table- 2). Drinking water is mined from underground and after chlorination is pumped directly to household of the study area. Out of total 19 over headed reservoirs in PMC area six lie in NCC zone

and three in Bankipore zone. In NCC zone total capacity of reservoirs is 0.65 million liter (ML) and 0.30 ML in Bankipore zone to cope with emergency situation or whenever supply is not functioning (Table-4). Nowhere in the study has area had underground tank for storing water whenever required to ensure a safe supply of water to the users. Out of total water production 111 MLD water is mined by water branch of PMC and remaining 23 MLD water by Bihar Rajya Jal Parishad (Table- 3). Due to no further areal expansion as new developed area in Bankipore zone there is no role of Bihar Raj Jal Parishad in supply of drinking water. Here total water whatever needed against demand of population in this area is produced by water branch of PMC. Except few government institutions and establishments no more role is left for Patna Health and Engineering Department (PHED) in terms of production of water in study area. No doubt to say that one stake holder that is water branch of PMC is carrying the responsibility of delivery of water supply in study area.

Table-2: Water Supply Practice in the Study Area

Components	NCC Zone	Bankipore Zone
Source of water	Underground water	Underground water
Provision of Water Treatment Plant	No	No
Use of Surface Water	No	No
Provision of Piped Water Supply by PMC	Yes	Yes
Quantity of Water Produced	134.14 MLD	68 MLD
Number of working Tube wells	31 (PMC) + 9 (BRJP)	19
Provision of purification of water	Chlorination	Chlorination
Total number of Chlorinated Plant	40	19
Number of closed Tube wells	8	2
Water Supply Head Works	3	2
Number of Distribution Network	3	1
Length of Water Distribution Network	248.70 Km.	77 Km.
Number of Overhead Tank	6	3
Total Capacity of Overhead Tank	.65 ML	.30 ML
Number of Underground Tank	None	None

Source – Water Supply Branch, Patna Municipal Corporation, 2010

Table-3: Water Supply by Different Institutions

Institutions	Water Produced (MLD)	
	NCC Zone	Bankipore Zone
PMC	111	68
BRJP	23	0
PHED	–	–

Source – Patna Municipal Corporation, 2010
Field Survey conducted during Oct. - Nov, 2010

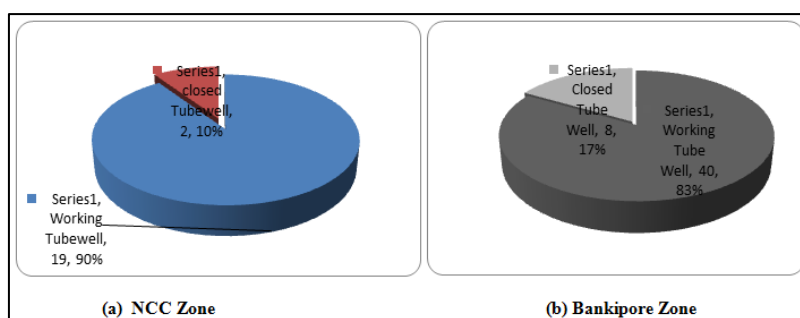


Fig-2: Condition of Tube Well

Source – Water Supply Branch, Patna Municipal Corporation, 2010

Table-4: Water Storage Tank

NCC Zone		Bankipore Zone	
Location	Capacity (Thousand litre)	Location	Capacity (Thousand litre)
New Patliputra Colony	100	Kadamkuan	100
Secretariat	150	Rajendra Nagar	100
High Court 1	100	University	100
MLA Flat	100		
Gardni Bagh	100		
Collectorate	100		

Source – Field Survey conducted during Oct. - Nov, 2010

Distribution of water supply

Since mined water is directly pumped to users through pipeline there is no need to store the water by providers. Through pipeline, hand pumps and stand posts drinking water is provided to population in study area. 250 km pipeline is laid down in NCC zone and 77km in Bankipore zone for providing the water to residential commercial and industrial users. For residential user no provision of metered connection it is levied on the basis of area rental value (ARV) calculated by PMC authority. In both zones the frequency of water supply is different. NCC zone enjoys the 14 hours of water supply in a day in four shifts where as in Bankipore zone 12h water supply in a day is delivered. It is said by officials in three and four shifts of duration of water supply in study area are not provided in other cities of India. Besides Piped water supply through other provisions that are stand posts and hand pumps the water demand is fulfilled in the study area (Table- 5).

400 stand posts and 800 hand pumps have been installed for water supply in NCC zone and in Bankipore zone it is done through 500 stand posts and 550 hand pumps especially in slum area and marginalized area in the both zones (Table- 5). Equipments available for water supply services include generator, tractor, and chlorination plant and water tanker. Water branch section has only one generator to cope with at the time of unavailability of electricity, three tractors and 20 water tankers (Table- 6). Out of total 88 chlorination plants 40 are available in the NCC zone and 19 in the Bankipore zone (Table- 6). In both zones all the working tube wells are equipped with chlorination plant for providing safe drinking water. Out of 20 water tankers available in water supply section nine are in NCC zone and six in Bankipore zone to provide water in emergency time or whenever required by people at the reasonable cost (Table- 7).

Table-5: Distribution of Water Supply in NCC Zone

Components	Zone	
	NCC	Bankipore
Total Length of Pipeline	250 km.	77 km.
Total number of Stand posts	400	500
Total number of Hand pumps	800	550
Frequency of Water Supply	5 am - 10 am 11 am - 1 pm 3 pm - 6 pm 7 pm - 11 pm	5 am - 11am 3 pm - 6 pm 7 pm - 10 pm
Metered connections	Domestic – None Non Domestic – 100 %	Domestic – None Non Domestic – 100 %

Source – Water supply branch, Patna Municipal Corporation, 2010

Table-6: Equipment used for Water supply in Study Area

Equipment	Description
Generator set	1
Tractor	3
Chlorination Plants	88
Water Tanker	20

Source – Water supply branch, Patna Municipal Corporation, 2010

Table-7: Water Tanker used for water supply in selected zones

Selected zones	Water Tanker		
	Actual	Required	Backlog
NCC	9	50	41 (82%)
Bankipore	6	20	14 (70%)

Source – Water supply branch, Patna Municipal Corporation, 2010

NCC zone has more new developed colony along with its periphery than that of Bankipore zone. New developed colony as well as slum area does not

access the piped water supply because of no availability of pipe network. Thus only seventy percent population in NCC zone are covered with piped water supply and in Bankipore zone the figure of population accessing piped water is high i.e., 90%. This figure states that out of 5.5 lakh population of NCC zone 3.85 lakh population access the piped water daily. In Bankipore zone 2 lakh population out of 2.3 lakh enjoy with supply water. In both zones the per capita water mining is not same due to variation in number of tube wells and power supply. In NCC zone per capita water production is 175 L that is less than what is produced in Bankipore zone amounting 222 L per capita per day. As per supply norms it may be mentioned that per capita water demand in million cities is 200 L a day. But against 200 L water demand the water availability is only 115 L a day in NCC zone and 140 L in Bankipore zone (Table-8). It is further noted that water supply demand of remaining population residing in newly developed area and slum area are fulfilled through own tube wells, hand pumps and stand posts installed in various part of the study area.

Table-8: Water supply Coverage in Study Area

Components	Description	
	NCC	Bankipore
Proportion of population served by piped water supply	70%	90%
Per capita water mining (in litre)	175	222
Per capita water requirement (in litre)	170	170
Per capita availability of water (in litre)	110	125
Total duration of water supply in a day	14 h	12 h

Source – Water supply branch, Patna Municipal Corporation, 2010
Field Survey conducted during Oct. - Nov, 2010

Cost recovery from water supply service

In the ambit of Municipal area people access the water through piped water service, hand pumps and stand posts installed by Patna Municipal Corporation. Households which get the water through pipeline lined by PMC are liable to pay water tax and water charges levied by PMC. But water supply service through hand pumps and stand posts are not accountable to pay the water tax or charges for that. Basically the hand pumps and stand posts are installed by PMC in the area which are devoid of water supply distribution network especially in slum area at free of cost. In the area users come from various segment of economic activities such as domestic users (residential area) and non-domestic users (commercial and industrial area). The provision to levy the water tax is different for domestic and non-

domestic users. In this respect it is observed that all domestic users are unmetered and are linked to the size of the plot to which the connection is provided for calculating the water tax, while non domestic users are metered and are determined on the basis of the quantity of water consumed. In Patna city for domestic users the water tax is charged at the rate of 2% of the annual rental value (ARV) and connection fee is levied at the rate of Rs 940 per connection when connection is approved. There is no any flat water charge besides it. For non-domestic users (commercial & industrial area) the water charge is levied based on quantity of water at the rate of Rs 3.5/kilolitre with connection fee Rs. 1450 (Table- 9). As earlier mentioned hand pumps and stand posts have also been installed by PMC in the area where piped water is not available, at the free of cost.

Table-9: Cost Recovery Instrument

Cost Recovery Instrument	Rate
Water Tax	2 percent of ARV of building
Water Charge for Non-domestic	Rs. 3.5 per Kilolitre
Domestic Water Connection Fee	Rs. 940 per Connection
Non Domestic Water Connection Fee	Rs. 1450 per Connection

Source – Annual budgets, Patna Municipal Corporation, 2010

Income and Expenditure Pattern on Water supply

It is noted that for understanding the performance of urban local government with respect to delivery of water supply service it is imperative to analysis the income - expenditure pattern over period of time. With analysis of income pattern in consecutive four financial years i.e., 2004-05, 2005-06, 2006-07, 2007-08, it is observed that the incomes are not consistently increasing or decreasing but with some variations therein. In the recent financial year 2007-08 the overall income from various sources is Rs. 35.68 million which is less than the income made in 2005-06 financial year. Further it is noted that most of the income comes from water tax component amounting 98% while the contribution of water connection fee (1.90%) and miscellaneous (0.1%) are meagre in cost

recovery (Table- 10). With respect of expenditure pattern on water supply service it is analyzed that the expenditure amount in consecutive four financial years is steadily increasing due to increasing expenses and maintenance and development charges of water distribution network and establishment of new pumping centre. The income earned from the water supply is less than the expenditure incurred on it. In 2007-08 the only 42% of total expenditure on water supply is recovered in order to maintenance and operation of water supply. The cost recovery from water service in previous financial years is not sufficient in order to cope with expenditure on it. Financial year 2007-08 experiences highest deficit with respect of delivery of drinking water along with remaining financial year experiencing deficit (Table- 11).

Table-10: Income from Different Sources of Water Supply (in Rs. million)

Components (in Rs.)	Year			
	2004-05	2005-06	2006-07	2007-08
Water Tax	30.51	-	33.85	34.94 (98%)
Water Connection Fee	-	-	1.97	0.7 (1.90%)
Miscellaneous	-	-	0	0.04(0.1%)
Total Income	30.51	46.47	35.82	35.68

Source – Annual budgets, Patna Municipal Corporation.

Table-11: Financial Analysis of Water Supply (in Rs. million)

Components (in Rs.)	Year			
	2004-05	2005-06	2006-07	2007-08
Income	30.51 (48%)	46.47 (62%)	35.82 (46%)	35.68 (42%)
Expenditure	64.17	74.74	77.65	85.40
Surplus/Deficit	(-) 33.66	(-) 28.27	(-) 41.83	(-) 49.72

Source – Annual budgets, Patna Municipal Corporation

In the city water tax is collected in two ways one is current collection and another is collection of arrear which is not collected in current financial year fall under the arrear for following years. Urban local government along with other functionaries prepare chart which determines what amount of money has to be collected in the financial year as arrear collection and current collection. But is observed that the actual collection as arrear and current both is far less than what has been estimated. It creates big gap in cost recovery. It is seen that in four consecutive years the financial gap is more or less same for arrear collection and current collection in 2007-08, only 26% of total estimated water supply revenue is recovered for both arrear and current account. With focusing upon the recovery pattern it is analysed that the gap in financial recovery is steadily increasing in consecutive financial years except in financial year 2005-06, which is the highest amounting 74% in 2007-08 due to lack of functionaries, and no strict rule and regulation for cost recovery and also caused by political interferences. In the 2007-08 only Rs. 13.97 million has been recovered against estimated recovery of Rs. 53 million as arrear

and Rs. 20.96 million collected against Rs. 79.80 million of estimated recovery as current recovery, which is far less that what has been estimated (Table-12).

Further water tax recovery estimation is analysed over consecutive four financial years in the study area. It is estimated that in NCC zone Rs. 26.40 million as arrear and Rs. 29.71 million as current collections have been estimated which contribute 47% and 53% in whole water tax estimation and in Bankipore zone estimation arrear shares 42% and current collection 58% in 2009-10 financial year (Table- 13). The estimation of water tax collection is not in similar pattern but they are fluctuating over period of financial years. Urban local government budgets fixes target for recovery of estimation. In the current financial year target is to recover 60% of total estimated arrear and 75% of total estimated current to be collected. As target arrear contributes 41.5% and current recovery shares 58.5% in NCC zone while in Bankipore zone arrear shares only 36% and current 64% in 2009-10 financial years (Table- 14).

Table-12: Water Tax Recovery Analysis (in Rs. million)

Year	Components (in Rs.)			
	Arrear		Current	
	Estimation	Actual	Estimation	Actual
2004-05	30.48	12.20 (40%)	45.02	18.30 (41%)
2005-06	33.53	18.58 (55%)	49.52	27.88(56%)
2006-07	36.88	13.53 (37%)	54.47	20.30 (37%)
2007-08	53.00	13.97 (26%)	79.80	20.96 (26%)

Source – Annual budgets, Patna Municipal Corporation

Table- 13: Status of Estimated Water Tax in Study Area (in Rs. million)

Year	Zone			
	National Capital Circle		Bankipore	
	Arrear	Current	Arrear	Current
2006-07	28.34	31.89	17.71	24.80
2007-08	31.17	35.07	19.48	27.28
2008-09	24.00	27.01	21.43	30.01
2009-10	26.40 (47%)	29.71 (53%)	23.58 (42%)	33.01 (58%)

Source – Annual budgets, Patna Municipal Corporation

Table-14: Status of Targeted Water Tax Recovery in Study Area (in Rs. million)

Year	Zone			
	National Capital Circle		Bankipore	
	Arrear	Current	Arrear	Current
2006-07	17.00	23.91	10.62	18.60
2007-08	18.70	26.30	11.69	20.46
2008-09	14.40	20.25	12.86	22.50
2009-10	15.84 (41.5%)	22.28 (58.5%)	14.14 (36%)	24.75 (64%)

Source – Annual budgets, Patna Municipal Corporation

Views on the quality of Water Supply

Since ward councillors are the local people who represent the ward in decision making body, as actors of participative democracy which is key component of urban governance. The perception of elected ward representative has been taken into account to analyse the status of water supply service available at ward level in the study area.

Perception on water supply service

As mentioned earlier 70 per cent of population is NCC zone and as 90% percent in Bankipore zone are served by piped water supply. The remaining population depend upon public stand posts, hand pumps and their own sources, Low income group people and residing in the slum area access the water from public stand posts and hand pumps installed by Patna Municipal Corporation, According to survey reveals that 80 percent of total wards in NCC zone and 92 percent in Bankipore zone enjoys with piped water supply. And remaining wards arrange their drinking water through public stand posts, hand pumps and their

own tube wells. Survey conducted to ward councillors reported that only 31 percent of ward in NCC zone and 30 percent in Bankipore zone get good quality of drinking water (Table- 15&16). Clean water is met where new pipe is distributed and proper maintenance of pipe network. The hand pumps, installed at depth of more than 150 feet, give clean water. Otherwise other sources and water supply through old and leakage pipe provide not clean & hygienic water.

The survey results say that availability of sufficient water to meet daily uses is not sufficient in all wards of both zones. In NCC zone only 40% of total wards access the adequate water & in Bankipore zone it is 60 percent. Remaining wards do not get sufficient water. This gap is minimized by own sources. The insufficient water supply is largely due to low water pressure, erratic power supply and leakage of water. It is further observed that in NCC zone where construction of new colony and fringe area and slum area are not accessing the taped water, if available in few areas, access insufficient water.

Table -15: Perceptions of Councilors on Urban Services in NCC Zone

Ward Number	Water Supply		
	Availability of Piped Water Facility	Quality of Piped Water Supply	Quantity of Piped Water Supply
1	No	N.A.	N.A.
2	Yes	Not clean	Sufficient
3	No	N.A.	N.A.
4	Yes	Not clean	Sufficient
5	Yes	Not clean	Not sufficient
6	No	N.A.	N.A.
7	No	N.A.	N.A.
8	Yes	Not clean	Not sufficient
9	Yes	Not clean	Not sufficient
10	Yes	Not clean	Not sufficient
11	No	N.A.	N.A.
12	Yes	Clean	Not sufficient
13	No	N.A.	N.A.
14	Yes	Not clean	Sufficient
15	Yes	Not clean	Sufficient
16	Yes	Not clean	Not sufficient
17	Yes	Clean	Sufficient
18	Yes	Clean	Sufficient
19	Yes	Not clean	Not sufficient
20	Yes	Not clean	Not sufficient
21	Yes	Not clean	Sufficient
22	Yes	Clean	Not sufficient
23	Yes	Not clean	Not sufficient
24	Yes	Clean	Sufficient
25	Yes	Clean	Not sufficient
26	Yes	Not clean	Sufficient
27	Yes	Not clean	Not sufficient
28	Yes	Not clean	Not sufficient
37	Yes	clean	Not sufficient

Source – Field Survey conducted during Oct. - Nov, 2010

Table-16: Perceptions of Councilors on Urban Services in Bankipore zone

Ward Number	Water Supply		
	Availability of Piped Water Facility	Quality of Piped Water Supply	Quantity of Piped Water Supply
36	Yes	Clean	Sufficient
38	Yes	Clean	Sufficient
39	Yes	Not clean	Sufficient
40	Yes	Not clean	Not sufficient
41	Yes	Not clean	Not sufficient
42	Yes	Not clean	Sufficient
43	Yes	Not clean	Sufficient
47	No	N.A.	N.A.
48	Yes	Not clean	Not sufficient
49	Yes	Clean	Sufficient
50	Yes	Not clean	Not sufficient
51	Yes	Clean	Sufficient

Source – Field Survey conducted during Oct. - Nov, 2010

Efficiency & equity in water supply service

Status of water supply service has been analysed in terms of availability of piped water supply and coverage area by piped distribution network, per capita availability of water, quality of drinking water,

proportion of personnel engaged and loss of water in piped water supply.

Piped water supply facility and coverage area

In the study area water supply is fulfilled through underground pipe distribution network. It ensures safe and easy supply mode of drinking water to households. Because it is supplied by urban local authority after purification of extracted water. Except new distribution network most of the pipes are too old to make supply efficiently. Sewerage pipe lines run together parallel with water pipe line creating contamination of drinking water because most of old pipelines suffer from leakage and posing rusting. It is noted that whole area of both zones not covered with water pipe line. In NCC zone only 70% of the households enjoy with piped water and this figure for Bankipore zone is 90% showing wider coverage than in previous one. At the ward level analysis it is observed that all wards in both zones do not enjoy with piped water supply, some of them which are situated at periphery as new developed colony arrange drinking water through their own arrangements by setting up private tube wells and hand pumps. As earlier mentioned percentage coverage of piped water distribution at ward level is more in Bankipore zone rather than in NCC zone. Economically sound people in the area access the safe and clean water form their own sources because they invest huge sum of money in digging the bore at greater depth. The area where piped water supply is not facilitated people/household coming from low income group and slum areas depend on public stand posts & public hand pumps installed by PMC at lower depth. With analysis of said information regarding piped water facility the level of efficiency and equity in terms of piped water facility is greater in Bankipore zone rather in NCC zone

Per capita availability of drinking water

In NCC zone total demand drinking water is 89 MLD but only 61 MLD is provided to them. The percentage gap in delivery of drinking water service is 31% but this figure for Bankipore zone is less i.e., 17% because 29 MLD water is supplied against demand of 35 MLD. Per capita availability of water to households indicates level of supply against demands. The population / households living in both zones face the scarcity of water that is bridged by other sources. It is noted that even though per capita water production in both zones is higher than demand but per capita effective availability of water doesn't fulfil the demand, because large volume of water is lost in distribution through iron pipe due to leakage and lack of proper management. In NCC zone households access only 115

L per capita water against demand of 170 L per capita. In Bankipore zone situation is not good, only 140 L per capita availability of water against 170L per capita demands. The major problem in the way of water supply is huge water loss due to leakage and poor water management. Per capita water loss is greater in Bankipore zone than in NCC zone. But if considering about per capita availability of water it is more in Bankipore zone against in NCC zone. As the result NCC zone experiences larger per capita gap in water supply thus it can be said that level of efficiency in Bankipore zone in terms of per capita availability of water to household is higher than in NCC zone (Table-17).

Quality of Drinking Water

Providing safe and clean drinking water is sole responsibility of urban local government. Ground water is used for supply of drinking water in study area. Even though availability of huge volume of surface water around the city but it is not utilized for same. Ground water is purified with chlorination process at each tube well centre. Thereafter it is pumped to households through underground pipe distribution network. Since most of the pipe had been distributed in 1913. It is observed that most of the places underground water pipe and sewerage pipe run together. As the result due to leakage and placing of water pipe with sewerage pipe line water becomes contaminated. Survey conducted in the study area reveals that in both zones most of the households do not access safe and clean water. According to survey data around in 30 percent wards households get the clean water in both NCC and Bankipore zone. It means in the study area about in 70 percent of wards households do not access the safe and clean water due to concerned problem. Thus it is not wrong to say that efficiency and equity in terms of quality of drinking water is not satisfactory in study area.

Personnel engaged in water supply

To maintain the efficiency of water supply service it is needed to have required number of employee who works efficiently. On the basis of water supply branch report it is noted that only 262 personal are employed at present against required number of 447 employees. It means 41 percent seats are vacant as backlog indicating huge gap in terms of personnel in water supply branch that obstruct smooth functioning of delivery, maintenance & monitoring the water supply and collecting the taxes and water charges on time.

Table-17: Efficiency in Water Supply Services in Study Area

Components	NCC Zone	Bankipore Zone
Provision of Piped Water Supply	Yes	Yes
Proportion of Engaged to Total Required Personnel	59%	59%
Proportion of Population/Household Covered by Piped Water (in %)	70%	90%
Total Demand of Drinking Water (MLD)	89	35
Total Supply of Drinking Water (MLD)	61	29
Shortage in Supply of Water (MLD)	28 (31%)	6 (17%)
Per capita water mining (in litre)	175	222
Per capita water requirement (in litre)	170	170
Per capita availability of water (in litre)	115	140
Per Capita Water Loss(in litre)	60 (34%)	82 (37%)
Per capita Gap in Water Supply (in litre)	55	30

Source – Water supply branch, Patna Municipal Corporation, 2010
Field Survey conducted during Oct. - Nov, 2010

Issues of Efficiency and Equity in Delivery of Services

In delivery of basic service such as water supply actors (urban local government, private agency, civil society and citizens) involving in achieving good urban governance face major issues and constraints that obstruct to attain sustainable city. As earlier in this study a description on prevailing management practice in relation to delivery of water supply service and cost recovery has been discussed, here under this section major focus is given to emerging issues and constraints before delivery of service and practice of its financial management. Field survey reveals that low level of basic service, less interaction between citizen, local government and inefficiency in financial management, disparities in the level and quality of service at ward

and inadequate attention given to service deficient ward are the major constraints of enjoying high quality of efficiency and equity in the study area. In both zones the degree of these issues are more or less same. Inadequate coverage by piped water supply, per capita water supply below norm, low quality of piped water supply are the major issues of management practice in relation to water supply. Former two issues are more effective in NCC zone rather than in Bankipore zone where as last one issue is prevailing in both zone with same effect. Other issues such as deficit in the income and expenditure account, low cost recovery from taxes and non-taxes, high dues of arrear which are similar effect in nature in both zones are prevailing in financial management practice (Table- 18).

Table-18: Issues and Constraints of Efficiency and Equity in Study Area

S.No.	Issues/Constraints	NCC Zone	Bankipore Zone
1	Low level of services		
2	Less interaction between citizen and local government		
3	Inefficiency in financial management		
4	Inadequate coverage by piped water supply		
5	Per capita water supply below norm		
6	Low quality of piped water supply		
7	Incomplete coverage by sanitary staff		
8	Deficit in the income and expenditure account		
9	Absence of instruments for pricing solid waste service		
10	Low cost recovery from taxes and non-taxes		
11	High dues of arrear		
12	Disparities in the level and quality of service at ward		
13	Inadequate attention given to service deficient ward		

Source - Field Survey conducted during Oct. - Nov, 2010

Note – Shade indicates specific issue

■ Specific issue more effective
■ Specific issue less effective

CONCLUSION

With analysis of efficiency aspect of governance a number of emerging findings which are associated with above investigation are described as follows.

In terms of level of service with respect to water supply Bankipore zone performs better than NCC zone because being a part of old city former have larger coverage distribution network of pipeline. But the quality of water is not satisfactory in both zones and especially slum people access poor quality of water

through public stand posts and hand pumps installed by PMC. Municipal personnel engaged in water supply service are inadequate in number; a huge backlog is existing resulting into deteriorating type of services provided. In water supply service it hampers the quality and quantity delivery as well as tax recovery on time. Inefficiency among urban local governments in financial management indicates to unsoundness of their finance resources making less efficient service delivery. Low tax rate on water supply and low recovery of water tax hampers the adequate supply of drinking water in study area. Further in new public management era only one actor that is PMC is involved in water supply violates the rolling back concept of state for sustainable city management. Adding that level of equity is absence at ward levels in terms of providing water supply service resulting into some wards which are occupied by low income group remain unserved.

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