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Research Article

A way to low cost, quality medicines: implementation of an essential medicines policy in public health facilities in Delhi (India)

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ABSTRACT

Access to essential medicines is poor in India. To improve accessibility of essential medicines, the Government of Delhi (India) implemented a drug policy based on the essential medicine concept in 1994. A list of essential medicines was selected and systems for quality assurance and pooled procurement of medicines were established. In this study the impact of the drug policy, on costs and quality of medicines has been assessed. The costs and quality of medicines procured by the Delhi Government's Central Procurement Agency (CPA), for public health facilities were analyzed from 1995 to 2009. The CPA costs were compared with procurement prices of other public sector agencies: Medical Stores Organization (MSO) and Tamil Nadu Medical Stores Corporation (TNMSC), local hospital tender, retail pharmacies (Government and private) and international reference prices. The costs of prescriptions in Public health facilities were monitored and the quality of medicines being procured was assessed. The findings showed that costs of essential medicines have decreased by 33.3% over 15 years. Over three years (2006-2009) the unit costs of medicines and the average expenditure per prescription increased marginally. The local tender prices were 27.2% and medicine costs at Government retail pharmacies 96.5% more than CPA prices. The procurement prices of agencies, with larger volumes of bulk purchase ie. MSO & TNMSC, were lesser than CPA prices by 18.7 % and 44.23% respectively. The private retail prices were variable and 242.7% to 897.12% more and international reference prices higher than CPA prices by 226%. The costs of medicines procured by CPA were lower than all other agencies, except MSO and TNMSC. The medicine samples that failed quality tests decreased from 1.45% to 0.13%. Implementation of an essential medicine policy by the Government of Delhi has enabled quality medicines to be procured at low costs. Such policies may help improve medicine accessibility in India.

Keywords: Essential medicines; drug policy; procurement; costs; quality; access

INTRODUCTION

Access to medicines is one of the primary components of the right to health and provision of essential medicines one of the key elements in the aim to attain health for all (Declaration of Alma Ata 1978; Hogerzeil et al. 2006). The World Health Organization (WHO) has estimated that about 1.3 to 2.1 billion people in the world, mostly in low and middle income countries, do not to have access to the essential medicines they need (WHO 2004). Amongst the many problems associated with the provision of essential medicines are escalating costs and inefficient procurement systems (Henry and Lexichin 2002; Pecoul et al. 1999; WHO 2002). Medicines are the second highest public health expenditure, after personnel, and consume 25% to 65% of total and private spending on health in developing countries (Quick et al. 1997a; Sakhtivel 2005; WHO 2004). Efficient procurement provides an opportunity for cost savings and improvement of procurement procedures has been ranked as an important priority for improving medicine affordability and accessibility (Rainhorn, Brudon Jakobowicz & Reich 1994).

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India

India has emerged as a leading supplier of generic medicines in the world. It is the third largest producer of medicines (by volume) in the world and 14th in terms of value. (Government of India 2012). Yet 65% of it's population does not have access to essential medicines (WHO 2004).

National Drug (Pharmaceutical) Policies

The National Drug Policy in India emanates from the Ministry of Chemicals and Fertilizers and not the Health Ministry. The focus of all National Drug Policies has been on increasing the growth of the pharmaceutical sector as an industry with no inbuilt mechanisms and structures for improving access to medicines in the country (Government of India 1994; 1986; 2006; Sakhtivel 2005; Srinivasan 2011).

The trade margins in pharmaceuticals in India are among the highest in the industry (Sakhtivel 2007). Thus despite the tremendous growth of the pharmaceutical industry in India, the situation regarding access to medicines for the population remains poor.

Financing of health and medicines

Financial resource allocation for health has been low in India. The total expenditure on health as a percentage of GDP is 5%, out of which the Government contributes only 0.94 (Shiva Kumar et al 2011). India is amongst the countries where households spend a disproportionate share of their consumption expenditure on health care, with the Government's contribution being minimal. The per capita spending by the Government on health for the year 2003-04 in real terms was Rs 120 (US$1=Rs.45). This is far below the US$ 12 recommended for an essential health package by the World Development Report 1993 (Rao et al 2005; World Bank 2004). Health insurance also covers a limited population. The total Government expenditure on pharmaceuticals has been approximately 10% of total expenditure on health (Sakhtivel 2005). Expenditure on health is primarily borne by out of pocket (OOP) expenditure and three fourths of the OOP expenditure on health is spent on medicines (61-90%). It has been acknowledged that many people have to sell their material assets to afford the costs of medical treatment (Sakhtivel 2005; Shiva Kumar et al 2011).

In the National Health Policy 2002, the Government of India has acknowledged that poor availability of essential medicines in public health facilitiess has contributed to the people not utilizing the public health facilities (Government of India 2002).

State Drug policies

India is a Union of 28 states and 7 Union territories. Under the Constitution of India, while health is a State subject, medicines is a concurrent subject (Under both the Union and State Government). A few States in India have adopted drug policies based on the essential medicine concept, as recommended by WHO (WHO 2002). In such a policy a list of essential medicines is selected and efforts are made to ensure that these are accessible to the population. Essential medicines are defined as those which are required to meet the health care needs of majority of the population and hence should be available at all times to all people (WHO 2002).

Delhi

Delhi is the National capital of India. It has a large population of 20, 438, 946. Delhi has the highest population density in the country (9340 persons per sq km as against 324 persons per sq km at All India level). Every year 200, 000 -300, 000 people settle in Delhi from other States. The number of people living below the poverty line (2.23 million) form 14.7% of the total population (Government of Delhi 2012)

Health Systems In Delhi

There are both public (Government) and private health systems in Delhi. Both the Allopathic and the Indian Systems of Medicine are practised. The public health system is functioning under multiple agencies, which includes Central Government and State Government agencies. The Public health facilities provides more than 50% of inpatient facilities while private facilities are used by majority for outpatient treatment by the people (WHO 2009). The share of medicines in out of pocket expenditure in rural households accounts for 61.83% and in urban households for 72.69% of the total expenditure on health. The per capita expenditure on medicines both for inpatient and outpatients is Rs. 324.99 in rural, and Rs 434.46 in urban households (Sakhtivel 2005).

To improve access to essential medicines, the Government of National Capital Territory (NCT) Delhi, adopted a drug policy based on the essential medicine concept in 1994 (Government of Delhi 1994). Prior to the adoption of the policy, it was observed that the Government of Delhi was spending 30-35% of the health budget on medicines, yet there was poor availability of good quality medicines. All health facilities had their own separate medicine lists and were purchasing them locally (Chaudhury et al. 2005). The Government of Delhi provides medicines free of cost to all patients in it's health facilities.

As part of the policy, the Government made an essential medicine list for all health facilities under its jurisdiction. The list is updated every two years. It set up a Centralized Procurement Agency (CPA) in the Directorate of Health Services (DHS), with a high level Special Purchase Committee to implement the Centralized Pooled Procurement and Distribution System for all health facilities. Procurement of medicines is based on generic names. Approval of drug suppliers (manufacturers) is based on competitive bidding through tenders with a strict pre qualification criteria (Directorate of Health Services 2008).To ensure quality of medicines being provided, quality assurance measures have been specified (Box-1).

The program has been functioning since 1994. This study was conducted with the aim of assessing the impact of the drug policy on costs and quality of medicines being procured through the centralized pooled procurement system established by the Government under the drug policy.

METHODS

The study was conducted in the National Capital Territory (NCT) Delhi, India. It was conducted after approval from the Institutional Scientific and Ethical Review

Box-1- Quality assurance measures as specified by Central Procurement Agency (Delhi) 2008

1. Pre qualification of tenders based on rigid parameters of selection.

   The manufacturers of medicines participating in the tender procurement have to fulfill the following criteria

   i) The minimum threshold level of annual turnover over the last three years must be Rs. 350 million ii) Good manufacturing practices (GMP) as per WHO standard. iii) Five years experience in manufacturing the product. iv) Inspection of manufacturing facilities by independent experts.

2. All batches of drugs delivered are tested for quality in approved accredited drug testing laboratories.

3. Action against manufacturers. If a drug sample is found to be below standard quality on testing, the total cost of test is recovered from the supplier and the firm debarred from supplying that drug for a period of two years. Where more than one drug supplied by the manufacturer is found to be "Not of Standard Quality", the firm is debarred from supplying any drug for a period of two years. In the case of immunological agents, firms are debarred to participate in the tender for five years, for that particular immunological agent.

4. If any doctor has any doubt about the qualify of a drug, they can send the sample to the hospital Superintendent for quality testing in any recognized testing laboratories.

5. The State Drug Controller of Delhi does random sampling from medicines on the market.

Committee and permission from Directorate of Health Services (DHS), Delhi.

Standardized methods developed by WHO for monitoring of drug policies and Health Action International (HAI) for comparing medicine prices were adapted and used (Brudon Jakobowicz, Rainhorn & Reich 1994; Gelders et al. 2005; HAI 2003). Comparison of medicine prices of CPA Delhi, from the year of inception of the drug policy and the first pooled procurement in 1995 till 2009 was done. The CPA costs of medicines were compared with other agencies

1) Public sector

   i) Local Open Tender of a public hospital (Delhi).

   ii) Other public sector procurement agencies a) Medical Stores Organization (MSO), which procures medicines for Government of India, (b) Tamil Nadu Medical Services Corporation (TNMSC) which procures medicines for the state of Tamil Nadu.

   iii) Government medicine retail pharmacies, Jan Aushidi (JA). These have been opened by the Government, where medicines are sold at costs lower than at private sector pharmacies.

2) Private retail sector

3) International reference prices

Costs of prescriptions in public health facilities (1 tertiary, 1 secondary, 2 primary) over three years (2006, 2007 and 2009) were also analyzed.

A basket of 31 medicines, based on morbidity data was selected to compare the cost of medicines in different periods and settings (Brudon Jakobowicz, Rainhorn & Reich 1994). For calculating the total value of the basket of medicines, the prevalence of each cause of consultation was required (we have to multiply the actual consumption of the medicines by the cost). This was however, not available. We have therefore used the exact quantities of medicines purchased by DHS. The rates at which the medicines were procured by CPA was obtained from DHS (1995, 1997, 1999, 2003, 2006, 2007, 2008-10).

The year 2006 was used as a basis for comparing costs of medicines both retrospectively till the year 1995, when the policy was implemented and the centralized pooled procurement begun and prospectively till the year 2009.

Private retail sector

Costs of medicines in the private pharmacies were collected by a survey of a sample of 27 retail pharmacies spread across all the nine administrative zones of Delhi (area 1483 km^2) (Directorate of Economics & Statistics 2006). The sample was selected based on the methodology as specified in the WHO manual on indicators for monitoring national drug policies. The administrative zones were combined into five zones (North, South, East, West and Central) and five to six pharmacies in each zone were selected. A commercial drug compendium Drug Today (2006) was also used for obtaining prices of medicines (Mishra 2006). Four retail prices for each medicine were obtained, the lowest, highest, average and the median price in the year 2006. The quantities of medicines procured by CPA, Delhi in the year 2006 were used for assessing and comparing the retail value of basket of medicines with the public sector.

Table 1: Comparison of unit costs of medicines at Central Procurement Agency in 1995, 2006 and 2009 (Rs.)

S. No.	Medicine	Formulation, Strength	Unit Cost 1995	Unit cost 2006	Unit cost 2009
1	Enalapril	Tab 5mg	0.19	0.12	0.18
2	Folic acid	Tab 5 mg	0.73	0.06	0.06
3	Phenytoin	Tab 100 mg	0.93	0.15	0.31
4	Paracetamol	Tab 500 mg	0.09	0.10	0.151
5	Amoxicillin	Cap 500 mg	2.15	1.00	1.5
6	Ranitidine	Tab 150 mg	0.34	0.24	0.24
7	Omeprazole	Cap 20 mg	1.55	0.34	0.25
8	Glibenclamide	Tab 5 mg	0.08	0.07	0.1
9	Metronidazole	Tab 400 mg	0.25	0.26	0.35
10	Salbutamol	Tab 2 mg	0.05	0.06	0.08
11	Chlorpheniramine maleate	Tab 4 mg	0.01	0.05	0.06
12	Chloroquin phosphate	Tab 250 mg	0.45	0.27	0.32
13	Mebendazole	Tab 100 mg	0.13	0.12	0.12
14	Oral rehydration solution	Powder (WHO*)	1.80	1.80	2.1
	Total		**8.73**	**4.63**	**5.82**

* Constitution as specified by WHO

International prices

The costs of medicine in the public sector were compared with international reference prices (IRP) (Frye 2008). The median international, unit, buyer prices for the year 2008 were compared with the public sector medicine costs in the years 2008 and 2009. The median price ratios (MPR) of the medicines were calculated by dividing the median price of each medicine at CPA with the IRP (for calculating MPR, we have to divide the median price of a medicine by the median international price. But CPA has only one approved price per medicine. Thus this price was used for the comparison).

For comparing costs of basket of medicines over different years and with different drug procurement and supplying agencies only those medicines which were available in the same strength and formulations, as specified in the basket of medicines and whose costs were available were selected. Thus, for comparing the costs of medicines from 1995 and 2006 (14 medicines); three years 2006, 2007 and 2008 (27 medicines); private sector (23 medicines); International Reference Prices (25 medicines), in the basket of medicines, were available. For comparing prices of MSO, TNMSC, hospital open tender and Jan Aushidi, we have also compared prices of medicines not included in the basket of medicines to increase the range of medicines for comparison (JA 2009; MSO 2009-11;TNMSC 2009a).

Indicators for monitoring drug policies

The following indicators from the manual " Indicators for monitoring National Drug Policies", specifically for assessing public sector procurement procedures and affordability of essential medicines were calculated (Brudon Jakobowicz, Rainhorn & Reich 1994).

I) PR 22: CIF/ex-factory value of a basket of drugs, out of "reference" value on the international market of the same basket. CIF/ex factory prices of medicines are those which are obtained at the port of entry. Since CIF/ex-factory costs of medicines were not available, for calculating the indicator we compared the CPA procurement prices for the year 2008 with IRP 2008.

ii) PR 30: Value of a basket of drugs, out of CIF/ex-factory value of the same basket. The numerator for this was calculated using the average retail drug prices for the year 2006. The denominator was calculated using the CPA procurement prices for the year 2006.

iv) PR 32: Value of a basket of drugs, out of value of the same basket, the year of reference. The costs in the year 2007 and 2008 were compared with the reference year 2006 for public sector prices.

v) OT4: Value of a basket of drugs, out of the value of the same basket with the cheapest drugs at retail prices. The average retail prices were compared with the lowest retail prices.

RESULTS

Prices in the public sector

The overall prices of medicines procured by CPA under the new policy, decreased by 33.3% in the total unit costs of medicines from 1995 to 2009. The actual cost of 8 out of 14 medicines decreased (Table 1). Comparison of costs of 21 medicines from 1997 to 2009 showed a steady decline till the year 2006 (- 10.59%), after which the costs started increasing. However, the total unit prices in 2009 are still lower than the 1997 prices by 7.45% (Figure 1).

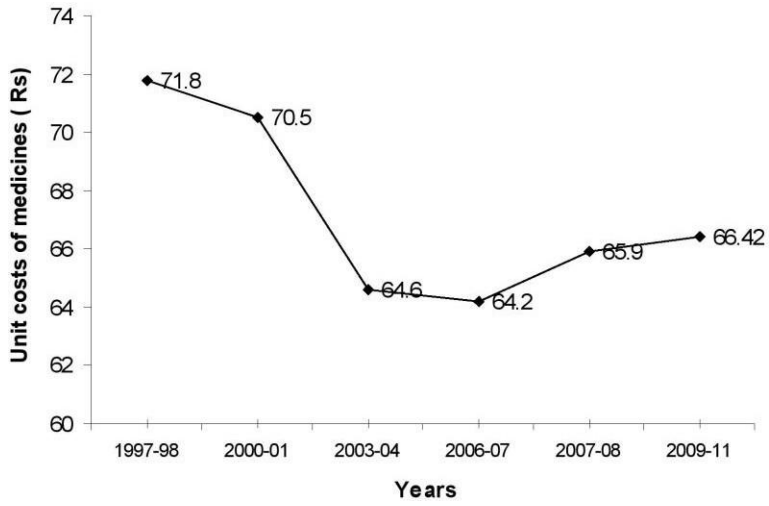

Figure 1: Unit costs of medicines procured by Central Procurement Agency Delhi (1997-2011)

Table 2: Unit and total cost of medicines at Central Procurement Agency in the years 2006, 2007, 2008 and 2009

Parameter	Year			
	2006	2007	2008**	2009
Total unit costs (Rs.)	86.12	87.13	87.13	86.21
Total cost of basket of medicines with actual quantities procured (Rs)	72,425,229.40	53,371,195.58	70,052,044.88	NA
% change *		-26.31	-3.28	
Total cost of basket of medicines with quantities of medicines procured in 2006 (Rs)	72,425,229.40	83,797,161.21	83,797,161.21	86,759,894.40
% change*		15.70	15.70	19.79

* Values indicate the percentage change in costs in comparison to the year 2006

** In 2008 the prices of medicines were same as in 2007

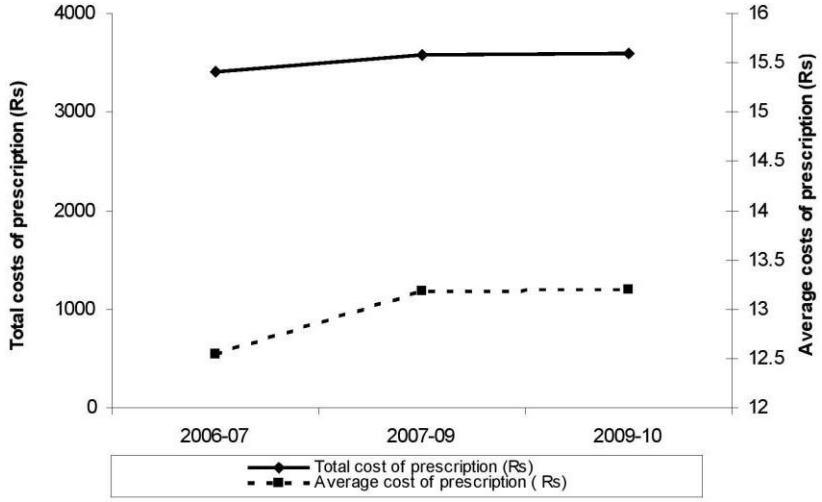

Figure 2: Costs of prescriptions (2006-2009)

The total value of basket of medicines, based on actual quantities of medicines procured, decreased in 2007 (-26.31%) and 2008 (- 3.28%) (Table 2). This was so because the quantities of medicines procured in 2007 and 2008 were lesser. However, on comparing the value of basket of medicines with the quantities of medicines procured in 2006, an increase of 15.7% (2007, 08) and 19.79% (2009) in the total value of basket of medicines was observed.

The total and average annual costs of prescriptions increased marginally over the last three years (Figure 2). The average increase in cost of prescriptions over three years was 1.07%.

Table 3: Costs of medicines procured by Central Procurement Agency and through Local Hospital Tender

S. No.	Medicine	Formulation, Strength	Costs (Rs.)	
			CPA Tender	Local open tender
			2006-07	2005-06
1	Atenolol	Tab 50 mg	0.12	0.33
2	Nimesulide	Tab 100 mg	0.08	0.144
3	Amlodipine	Tab 5 mg	0.13	0.45
4	Fluconazole	Tab 200 mg	2.38	3.36
5	Ciprofloxacin	Tab 250 mg	0.45	0.48
6	Paracetamol	Tab 500 mg	0.1	0.18
7	Ibuprofen	Tab 400 mg	0.214	0.34
8	Albendazole	Tab 400 mg	0.09	1.2
9	Ranitidine	Tab 150 mg	0.24	0.29
10	Cephalexin	Cap 500 mg	1.59	2.9
11	Cephalexin	Cap 250 mg	0.83	1.1
12	Cloxacillin	Cap 250 mg	0.62	0.92
13	Cefuroxime	Inj 750 mg	32.4	36
14	Frusemide	Inj 10 mg/ml, 2 ml	0.99	2.43
15	Hyoscine butyl bromide	Inj 20 mg/ml	4.41	6.47
16	Ranitidine	Inj 50 mg/ 2 ml	0.95	1.38
	Total		**45.59**	**57.97**

CPA: Central Procurement Agency

Table 4: Costs of medicines at Central Procurement Agency (Delhi) and Medical Stores Organization (India)

Total number of medicines	90
Agencies	**Total unit costs (Rs)**
MSO (2007-10; 2009-12)	1436.21
CPA (2008-2011)	1767.07

MSO: Medical Stores Organization; CPA: Central Procurement Agency

Other public sector medicine procurement prices

a) Local Open tender of a public hospital: The unit prices of 16 medicines procured through open tender of the year 2005-06 were higher than CPA prices for the year 2006-07 by 27.16% (Table 3).

b) MSO, India: The CPA prices were higher for 59 (65.56%) out of 90 medicines. The total unit costs of medicines with CPA prices was 18.7% (2009-11) more than MSO prices of medicines (Table 4).

c) TNMSC: On comparing prices of 39 medicines, the prices of 36 medicines were lower with TNMSC (Table 5). The price of one medicine, injection methyl prednisolone 500 mg. was priced at Rs.104 with TNMSC and the same injection in a strength of 250 mg was priced at Rs.191.24 with CPA. The total unit costs of basket of medicines at CPA prices was 18.99% and overall 45.83% more than TNMSC.

d) Public Sector Retail Pharmacy (Jan Aushidi): The prices of all 30 medicines compared were higher at Jan Aushidi (Table 6). The total unit costs of basket of medicines at Jan Aushidi were 69.55% and of total medicines 96.51%, more than CPA prices. On comparison, medicine costs were highest at Jan Aushidi stores, followed by CPA and TNMSC (Figure 3)**.**

Prices in the private sector

A large variation in costs of individual medicines was observed in the private retail sector. The total unit costs of medicines at lowest prices available was Rs.127.33 and at highest prices was Rs.189.95 (+ 49.18%) (Table 7). The private sector prices for the year 2006 were much higher than the CPA prices for the years 2006-07 and 2009-11 (Figure 4). The value of a basket of medicines was 232.02% (at lowest prices) to 890.45% (at highest prices) more than the value at CPA 2006-07 prices. At 2009-11 CPA prices also the value of basket of medicines in the Private Sector (2006 prices) was 168.22% (at lowest prices) to 700.1% (at highest prices) more than the CPA prices.

International reference prices

The unit costs of medicines at IRP 2008 rates was higher than CPA costs for the years 2007-08 and 2009-11 (Table 8). The total value of a basket of medicines at CPA costs (2007-08) was 43.21% and at CPA costs (2009-11) was 57.27% of IRP 2008 (Figure 5). The MPR of all medicines with CPA costs was lesser than 1 for both years 2007-08 and 2009-11, at 2008 IRP.

Drug Policy Indicators

Table 9 shows the results of the Drug Policy Indicators. It was observed that the increase in the total value of

Table 5: Comparison of costs of medicines procured by Central Procurement Agency (Delhi) and Tamil Nadu Medical Services Corporation 2009

S. No.	Medicine	Formulation, Strength	Costs (Rs.)		
			CPA	TNMSC	% difference
1	Thiopentone sodium	Inj 500 mg/ml	13.86	15.85	14.36
2	Pentazocine lactate	Inj 30 mg/ml	2.69	2.44	-9.29
3	Diazepam	Inj 5 mg/ ml	1.57	1.04	-33.76
4	Atropine sulphate	Inj 0.6 mg/ml	1.17	0.77	-34.19
5	Sodium chloride	Inj 0.9%, 500 ml	9.2	7.05	-23.37
6	Dextrose	Inj 5%, 500 ml	9.24	7.05	-23.70
7	Heparin Sodium	Inj 5000 IU/ml, 5 ml	31.98	58.59	83.21
8	5 Flourouracil	Inj 250 mg/ 5 ml	6.5	5	-23.08
9	Amikacin sulphate	Inj 100 mg/ 2 ml	3.12	2.43	-22.12
10	Vincristine sulphate	Inj 1 mg/ml	29.5	18.53	-37.19
11	Cyclophosphamide	Inj 200 mg	13	11.27	-13.31
12	Ceftriaxone Inj 1 gm	Inj 1 gm	11.79	12	1.78
13	Calcium gluconate	Inj 10 ml	7	1.98	-71.71
14	Methyl prednisolone	Inj 500 mg		104	
	Methyl prednisolone	Inj 250 mg	191.24		-100
15	Anti snake venom serum	Inj 10 ml	347	114.3	-67.06
16	Tamoxifen	Tab 10 mg	0.55	0.35	-36.36
17	Lignocaine HCl	Gel 2%, 30 gm tube	8.56	6.87	-19.74
18	Vaginal povidone iodine	Pessary 200 mg	1.44	0.46	-68.06
19	Cotrimoxazole	Syrup 50 ml	5.3	4.95	-6.60
20	Albendazole	Suspension 400 mg/10 ml	2.96	2.64	-10.81
21	Chloroquin sulphate	Syrup 50 mg/ml	7.5	4.4	-41.33
22	Vitamin C	Tab 100 mg	0.22	0.16	-27.27
23	Ferrous sulphate + folic acid	Tab Adult	0.2	0.07	-65
24	Ferrous sulphate + folic acid	Tab Pediatrics	0.15	0.04	-73.33
25	Atenolol tab 50mg	Tab 50 mg	0.12	0.09	-25
26	Amlodipine	Tab 5 mg	0.09	0.05	-44.44
27	Enalapril	Tab 5 mg	0.18	0.07	-61.11
28	Folic acid	Tab 5 mg	0.06	0.04	-33.33
29	Paracetamol	Tab 500 mg	0.151	0.15	-0.66
30	Paracetamol	Syrup 125 mg/ 5 ml, 60 ml	4.58	4.31	-5.90
31	Ranitidine	Tab 150 mg	0.24	0.19	-20.83
32	Omeprazole	Cap 20 mg	0.25	0.23	-8
33	Glibenclamide	Tab 5 mg	0.1	0.04	-60
34	Chlorpheniramine maleate	Tab 4 mg	0.06	0.03	-50
35	Chloroquin phosphate	Tab 250 mg	0.32	0.26	-18.75
36	Oral rehydration powder	WHO specification	2.1	1.6	-23.81
37	Gentamycin	Eye drops 0.3%	2.79	2.48	-11.11
38	Povidone iodine	Solution 5%	32.8	26.02	-20.67
39	Ciprofloxacin	Tab 500 mg	1.11	0.846	-23.78
	Total		**750.691**	**418.646**	**-44.23**

CPA: Central Procurement Agency;

TNMSC: Tamil Nadu Medical Services Corporation

basket of medicines using 2006 quantities of medicines purchased was 16% over one year and 19% over three years.

The average retail costs of a basket of medicines was 440 % more than CPA costs. The difference in the average and lowest retail costs of medicines was 62.66%. The CPA costs of medicines were 43.41% of International costs of medicines.

QUALITY

The number of batches of medicines tested increased from 756 to 2305, an increase of 204.89% from the year 2000 to 2009. The total number and percentage of batches of medicines failing decreased from 11 (1.45%) in the year 2000-01 to 3 (0.13%) in the year 2008-09 (Figure 6).

Table 6: Comparison of cost of medicines at Central Procurement Agency and Government retail outlets (Jan Aushidi)

S. No.	Medicine	Strength	Unit cost (Rs)	
			CPA 2009	Jan Aushidi 2009
1	Cetirizine	Tab 10 mg	0.073	0.248
2	Cetirizine	Syrup 5 mg/5 ml, 60 ml	3.95	8.6
3	Amikacin	Inj 100 mg/2 ml	3.12	5.6
4	Amikacin	Inj 250 mg/2 ml	4.74	7.9
5	Ciprofloxacin	Eardrops 0.3%, 5ml	2.79	5.8
6	Norfloxacin	Tab 400 mg	0.64	1.3
7	Ofloxacin	Tab 200 mg	0.756	1.51
8	Ofloxacin	Tab 400 mg	1.49	2.86
9	Ciprofloxacin	Tab 250 mg	0.614	0.999
10	Amoxycillin	Tab 250 mg	0.86	1.19
11	Ampicillin	Tab 250 mg	0.87	1.13
12	Ampicillin	Tab 500 mg	1.64	1.967
13	Ampicillin sod	Inj 250 mg vial	4.66	5.3
14	Ceftazidime	Inj 500 mg vial	19.8	33.3
15	Ceftazidime	Inj 1gm	29.29	61.4
16	Ceftazidime	Inj 250 mg	9.32	19.8
17	Ceftriaxone	Inj 500mg	8.1	20.2
18	Ceftriaxone	Inj 1 gm	11.79	33.8
19	Cefuroxime axetil	Tab 250 mg	4.59	9.25
20	Cephalexin	Cap 250 mg	1.188	1.56
21	Cephalexin	Cap 500 mg	2.17	2.83
22	Cephalexin	Tab 125 mg	0.753	0.97
23	Doxycycline	Cap 100 mg	0.441	0.65
24	Tetracycline	Cap 250 mg	0.37	0.53
25	Domperidone	Tab 10 mg	0.14	0.208
26	Domperidone	Suspension 5 mg/5 ml, 30ml	5.5	6.8
27	Albendazole	Tab 400 mg	0.59	1.24
28	Albendazole	Suspension 200 mg/5 ml,10ml	2.96	5.6
29	Ibuprofen	Tab 400 mg	0.295	0.39
30	Nimuselide	Tab 100 mg	0.107	0.24
31	Chloroquin phosphate	Tab 250 mg	0.32	0.365
	Total		**123.93**	**243.54**

CPA: Central Procurement Agency

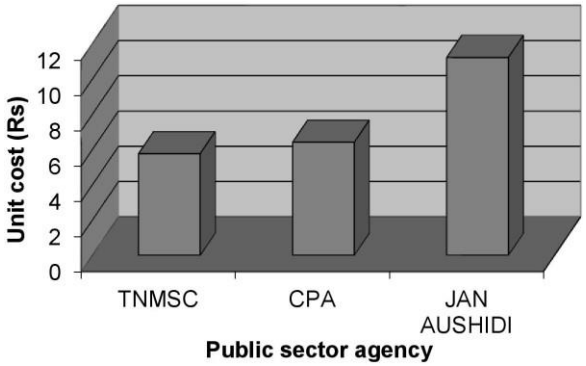

Figure 3: Costs of medicines with different public sector agencies

DISCUSSION

A medicine policy based on the essential medicine concept is a vital tool for making medicines accessible to all populations, especially so in populations with limited resources (Quick et al. 1997a; WHO 2002). Pooled and bulk procurement of medicines competitively has been seen to achieve savings of 40% to 60% in medicine purchases of many countries (OECS 2010; Rosadio 2001; WHO 1999).

Table 7: Comparison of medicine prices in the private retail and public sector (Central Procurement Agency)

Medicine prices	Total unit cost (Rs.)	Total cost* (Rs.)	% difference! With 2006 costs	%difference# With 2009 costs
Private Retail Sector (2006)				
Lowest	127.33	206150297.4	232.02	168.22
Maximum	189.95	614950098.7	890.45	700.1
Average	150.54	335342351.64	440.11	336.31
Median	146.15	345133447.93	455.88	349.05
Public Sector (2009)	57.96	76858440.8	23.79	
Public Sector (2006)	57.5	62087879.2		

* Total cost of basket of medicines with quantities procured in the year 2006

! With reference to the total cost of basket of medicines in the year 2006

With reference to the total cost of basket of medicines in the year 2009

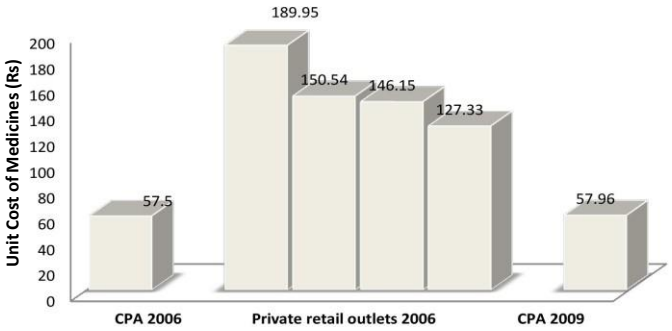

Figure 4: Costs of medicines in the private retail outlets and Central Procurement Agency (Delhi)

The implementation of such a medicine policy with pooled procurement of medicines for all public health facilities under its jurisdiction by the Government of Delhi (India) has curtailed increase in costs of medicines. In many cases the costs have actually decreased over 15 years. Savings in costs of medicines has been achieved in comparison to procurement by local open tender, the procedure being followed routinely by individual health facilities, prior to the implementation of the medicine policy in 1994. Open tender medicine purchases are done occasionally by hospitals, if the supply of medicines through CPA is not regular for some reason and for medicines not on CPA 's essential medicine list. It is of significance that the local open tender medicine prices for the year 2005-06 were higher than the CPA prices for the year 2006-07.

The CPA medicine prices were much lesser than those at Government retail outlets (JA). These retail outlets have recently been opened by the Government, to supply generic medicines to patients at low costs. It may be a better option for the Government to establish medicines prices through CPA rate contracts and supply these medicines to the retail pharmacies to further bring down the costs of medicines for the patients at these outlets. A similar approach has been implemented in Chittorgarh, a town in another state of Rajasthan (India), where Cooperatives selling only generics have been established by the administration. The medicines are bulk purchased and supplied by the administration to the cooperatives and these are sold to patients at a minimum profit to make the project sustainable (Srinivasan 2011). In another state of India, Tamil Nadu also, the TNMSC is operating retail pharmacy outlets where generic medicines procured through centralized procurement are sold to patients at low costs (TNMSC 2009b). In both the states of Rajasthan and Tamil Nadu, the State Governments have implemented drug policies based on the essential medicine concept in public health facilities.

However, the prices of other large public sector procurement agencies ie. MSO and TNMSC were lower for most medicines in comparison to CPA. The MSO is a large organization of the National Government of India, which procures medicines for Central Government health facilities all over the country and for the National Health Programmes. The main office is located in Delhi.

TNMSC is a state procurement agency like CPA, overseeing procurement of medicines and surgical consumables for 11, 059 institutes in the State of Tamil Nadu, which has a much larger area (1, 30, 058 $km^{2.}$) than Delhi (1483 km^2). The number of Delhi Government health facilities is approximately 400.

The lower procurement prices of MSO and TNMSC are because of the larger volumes of medicines being procured. Another possible reason could be their tender pre qualification criteria. The tendering manufacturers have to have a minimum turnover of Rs.3.5 million to qualify for TNMSC, at MSO a minimum turnover of Rs. 100 million for generic and Rs. 250 million for proprietary medicines is required. CPA has a requirement of a minimum turnover of 350 million ie 100 times more than TNMSC and 3 ½ times more than MSO. Thus it is

Table 8: Comparison of cost of medicines in Central Procurement Agency with international Reference Prices

S.No.	Medicine Name	International reference price 2008 ($)	IRP in Rs	Total Cost* IRP 2008 (Rs)	CPA price 2008 (Rs)	Total Cost* CPA 2008 (Rs)	% Interna-tional Cost	Median Price Ratio
1	Amlodipine Tab 5 mg	0.0526	2.24	7,067,862.17	0.09	268,613.60	3.80	0.038
2	Amoxicillin Cap 500 mg	0.0376	1.60	16,870,782.52	1.49	15,723,180.30	93.20	0.932
3	Amoxicillin sus-pension 125 mg/ml	0.0060	0.26	124,577.65	0.17	82,036.08	65.85	0.659
4	Atenolol Tab 50 mg	0.0098	0.42	767,974.89	0.12	221,161.20	28.80	0.288
5	Carbamazepine Tab 200 mg CR	0.1713	7.28	22,899,877.34	0.97	3,049,680.00	13.32	0.133
6	Chloroquine phosphate Tab 250 mg	0.0199	0.85	491,358.14	0.29	168,403.00	34.27	0.343
7	Chlorpheniramine maleate Tab 4 mg	0.0042	0.18	2,642,239.57	0.06	887,730.00	33.60	0.336
8	Ciprofloxacin Tab 500 mg	0.0289	1.23	6,249,290.81	0.85	4,322,734.50	69.17	0.692
9	Enalapril Tab 5 mg	0.0125	0.53	3,919,211.91	0.13	958,603.10	24.46	0.245
10	Gentamicin Eye drops 0.3%	0.0680	2.89	563,554.98	0.58	113,047.80	20.06	0.201
11	Folic acid Tab 5 mg	0.0027	0.11	3,053,671.60	0.06	1,595,940.00	52.26	0.523
12	Glibenclamide Tab 5 mg	0.0049	0.21	1,241,441.56	0.07	417,095.00	33.60	0.336
13	Ibuprofen 400 mg	0.0091	0.39	4,568,506.12	0.24	2,833,680.00	62.03	0.620
14	Ibuprofen sus-pension 100mg/ 5ml	0.0064	0.27	36,974.03	0.11	14,945.70	40.42	0.404
15	Isosorbide dini-trate Tab 10 mg	0.0125	0.53	64,630.40	0.07	8,512.00	13.17	0.132
16	Mebendazole Tab 100 mg	0.0061	0.26	17,832.86	0.09	6,187.86	34.70	0.347
17	Metoclopramide Tab 10 mg	0.0070	0.30	288,919.15	0.11	106,777.00	36.96	0.370
18	Metronidazole Tab 400 mg	0.0121	0.51	3,750,147.62	0.29	2,113,818.70	56.37	0.564
19	Omeprazole Cap 20 mg	0.0293	1.25	12,148,146.84	0.30	2,925,300.00	24.08	0.241
20	Oral rehydration solution	0.1512	6.43	8,699,433.83	2.16	2,922,804.00	33.60	0.336
21	Paracetamol 125 mg/5ml	0.0046	0.20	179,007.75	0.08	69,830.52	39.01	0.390
22	Paracetamol Tab 500 mg	0.0056	0.24	4,838,321.55	0.15	3,068,247.52	63.42	0.634
23	Ranitidine Tab 150 mg	0.0178	0.76	18,046,898.30	0.27	6,438,031.20	35.67	0.357
24	Salbutamol Tab 2 mg	0.0091	0.39	664,710.48	0.08	135,714.10	20.42	0.204
25	Salbutamol Syrup 2 mg/ml	0.0029	0.12	41,810.04	0.06	19,666.06	47.04	0.470
	Total	**0.6743**	**28.67**	**112,169,319.9**	**8.79**	**48,471,739.24**	**43.21**	

Rate of 1 US $ in July 2008: Rs. 42.52; IRP: International Reference Price; * Total cost = Unit cost of medicine X Total number of units procured in 2008

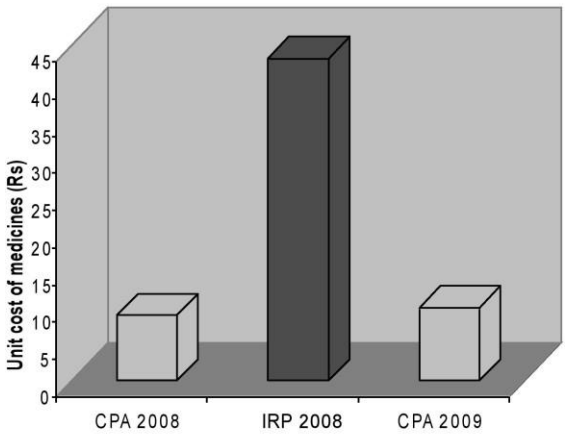

Figure 5: Unit costs of medicines at Central Procurement Agency and International Reference Prices

Table 9: Indicators for monitoring drug policies

S. No.	Parameter	Result
1	Value of a basket of medicines, out of value of the same basket the year of reference, using actual quantities of medicines procured (PR 32) a) 2007/2006 b) 2008/2006	 73.69 % 96.72 %
2	Value of a basket of medicines, out of value of the same basket the year of reference, using 2006 quantities of medicines procured (PR 32) a)2007/2006 b) 2009/2006	 116.00 % 119.00 %
3	Value of a basket of medicines, out of the value of the same basket with the cheapest medicines (OT4)	162.66%
4	Value of a basket of medicines, out of CIF/ex-value of the same basket. Since CIF/ex-factory prices were not available, procurement prices of CPA (Delhi) have been used (PR 30)	440.11%
5	CIF/ex-factory value of a basket of medicines out of "reference" value on the international market of the same basket (PR22)	43.21%

possible that manufacturers with higher priced medicines enter into the tender process in Delhi. The tender pre qualification criteria was increased in CPA Delhi in the year 2006 from 120 million to 350 million. It was after this change that the declining trend in costs of basket of medicines started increasing. The reason for a higher turnover was to ensure better quality of medicines as well as to ensure supply. But TNMSC is assuring quality of it's medicines by GMP certification and testing of all batch samples. The number of samples failing have decreased from 3.1% (1990) to 0.29% (2005-06) (TNMSC 2009b). The same is being followed at MSO.

Thus higher financial turnover of drug manufacturers which may also be because of higher medicine prices may not be the most appropriate criteria for ensuring quality. The factors that determine medicine prices in the market are many and varied. And the price of the same medicine being manufactured by two different companies may vary from 52- 3000% (Roy & Rewari 1998). CPA Delhi also has a strict quality assurance system in place. The number of medicine samples failing quality tests have decreased. Thus reconsideration of tender qualification criteria with lowering of the turnover criteria may increase competition and result in still lower prices.

The prices of medicines in the private retail sector were high and variable in comparison to CPA prices. The 2006 private sector prices were even higher than 2009 public sector prices. This is primarily because of the successive National Pharmaceutical Policies in existence in the country. There are no incentives in place for manufacturers to provide essential medicines at cheaper prices. The affordability of medicines in the private sector is poor, with a worker on daily wages having to work for 1 to 3 days to be able to procure his treatment for community acquired pneumonia depending on the brand of antibiotic prescribed (Roy, Gupta & Agarwal 2012). The results highlight the wide margin in retail costs of medicines and those through public sector pooled procurement.

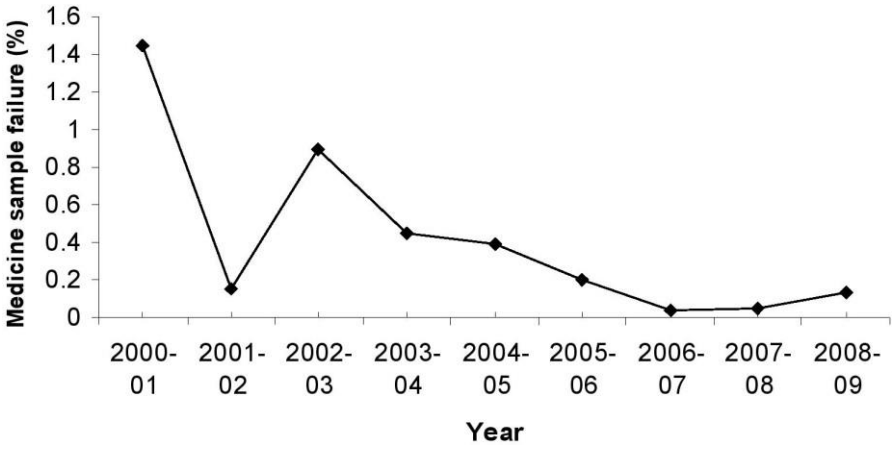

Figure 6: Failure of medicine samples over 8 years at Central Procurement Agency

The CPA (Delhi) procurement prices were much lesser than the IRP (2008) for both the years 2008 and 2009. This was when the costs of freight, taxes etc were not added to the IRP. The procurement system in place presently does not allow for international tenders. It is hypothesized that not allowing international tenders decreases competition and ultimately harms local interests in terms of medicine costs and manufacturing (Quick et al. 1997b). However, the results show that at present, CPA (Delhi) is procuring medicines at very effective rates.

Although the Centralized pooled procurement of medicines, by CPA, Delhi has been effective in curtailing increase in costs of medicines, there is scope for further improvement. CPA (Delhi) at present is procuring medicines only for health facilities under the jurisdiction of Government of Delhi. However, there are more than ten major public health agencies functioning in Delhi (Government of Delhi, Municipal Corporation Delhi, New Delhi Municipal Corporation, Central Government Health Schemes, Directorate General Health Services, Employee State Insurance Corporation, Northern Railways, Ministry of Defence/ Delhi Cantonment Board, Delhi Transport Corporation, Delhi Jal Board, Reserve Bank of India, State Bank of India, Other Autonomous Bodies, Voluntary Agencies, etc) (Government of Delhi 2009). All these have their own procurement systems. Pooling of requirements by all public health agencies for the State of Delhi may further lower prices, as has happened in the State of Tamil Nadu.

Further, procurement could be expanded on a Regional basis as has been done in many developing countries such as the Organization of East Caribbean States (OECS), comprising of nine countries, Gulf Cooperation Council (GCC) representing six countries of the Gulf and Union of Arab Maghreb (UMA) comprising of five countries. In all these countries it was realized that improving the use of existing resources could be best achieved by efficient procurement procedures. The countries joined efforts in regional cooperation for pooled purchasing of medicines and other supplies. The prices obtained were 30% to 54% lower by pooled procurement. In all these regional groupings of countries, political will, administrative support and technical expertise to establish the system were instrumental in ensuring the success of the programmes. The public health utility of such an initiative was realized as early as late 1970s (Mamdani and Walker 1986; OECS 2010; Quick et al. 1997b. WHO 1999).

To begin with the States in India following a drug policy based on the essential medicine concept, could align together for pooled procurement to obtain a better financial resource utilization (there are 14 states in India that have some aspects of essential medicine policies in place). This would require political will and financial commitment. It may not be easy to do so. The success of all regional drug procuring organizations has been based on this.

The World bank reports that about 35 million Indians live on less than US $ 1 per day (Enerard 2003). The medicine needs of this subset of the population may not be met even if market costs of medicines were somehow decreased. In the National Pharmaceutical Policy 2012, it has been proposed that all medicines (348) on the National Essential Medicines list will be brought under price control. But this policy has yet to be implemented (Government of India 2012). India is a paradoxical example of a country with a vibrant pharmaceutical industry, exporting generic medicines to many countries, yet because of the lack of commonality of purpose between the pharmaceutical and health policy, access to medicines remains poor. In such a scenario, Government medicine policies based on the essential medicine concept with emphasis on pooled procurement and good quality assurance systems in place provide a viable solution to improving affordability of medicines. The observations of this study are relevant for all countries, especially low and middle income countries struggling to improve access to essential medicines for their populations.

It is known that costs of medicines is only one aspect in ensuring access to medicines for patients. The other factors include availability, proper storage, distribution

and rational use of medicines. However, medicine costs are an important determinant, since if medicines are unaffordable then other factors would not be relevant.

For the purpose of comparison of prices of medicines, a list of basket of medicines based on the local morbidity pattern and standard treatment guidelines was used, rather than the list given by Health Action International (HAI) (HAI 2003). A list of medicines based on local morbidity pattern is better for comparison of prices within a local area. For cost comparison the absolute costs of drugs have been used.

The limitation of this study was that for comparing values of basket of medicines, we did not have the data on the actual prevalence of diseases available. Another problem was the lack of availability of some formulations and strengths for comparison of prices across different agencies and sectors.

CONCLUSION

The Delhi State's drug policy based on the essential medicine concept has had a major impact on restraining increase in costs of medicines. Quality medicines are being procured at low prices. Establishing an essential medicine list and a good centralized procurement procedure with quality assurance systems in place has enabled cost savings. Possibility of further improvement in procurement prices is there, if pooling pooling of medicine requirements by other public sector health agencies within Delhi is attempted. Such a program would ultimately benefit the population at large.

Competing Interest/ Conflict of interest

There is no financial conflict of interest. V. Roy is a member of the Special Purchase Committee of Government of NCT of Delhi and Member Secretary of the Committee for Selection of Essential Drugs, Government of National Capital Territory (Delhi)

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