

## Price Variation and Availability of Free Medicine for Non-communicable Diseases

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### ABSTRACT

**Background:** Nepal is witnessing rise in non-communicable chronic diseases. Costs of the medicine, availability of the medicine for free in public health sectors and variation of price of medicines may play an important role in the management of chronic disease. The study was undertaken to find out the variation in price of drugs used for treating non-communicable diseases among private pharmacies and availability of free essential medicines in public facilities.

**Methods:** Randomly selected 33 public health centers and 13 pharmacies were included for the study. Availability of free essential medicines for treating selected chronic diseases was assessed in public health centers and percentage price variation in various branded drugs used for treating these diseases was assessed at the consumer level.

**Results:** Out of 89 different formulations, variations between maximum and minimum priced brands of more than 100% were observed in 37 formulations and that of > 200% in 22 formulations. Thirty-seven formulations had more than 100% inter-pharmacy variation. The most commonly available free essential medicines was 4 mg salbutamol (88.57%) while the least available free essential drug was levothyroxine 5 mg (9.0%).

**Conclusions:** Considerable variation in prices is seen among similar drugs and in prices of same drug in different pharmacies. These factors may have implications in the management of chronic disease in Nepal offsetting the government's effort to control chronic diseases.

**Keywords:** Chronic diseases; essential medicines; price variation.

### INTRODUCTION

In developing countries, the prevalence of non-communicable diseases (NCDs) is on rise with increasing life expectancy, urbanization and changing lifestyle. The prevalence of hypertension, diabetes and cardiovascular diseases and their risk factors are reported to be high in Nepal.<sup>1-3</sup> Pharmaceutical companies produce drugs with considerable price variation among different brands of same drug.<sup>4</sup> In Nepal, most of the health care expenditure is out of pocket of patients and medicines account for 25-70% of total health care expenditure.<sup>5</sup>

Essential medicines are those that satisfy the priority health care needs of the population.<sup>6</sup> The mean and median availability of essential medicines for non-communicable diseases was found to be 36% and 7.5% respectively.<sup>7-8</sup> The availability of essential medicines to treat NCDs is largely unknown in Nepal.

This study was undertaken to find out the variation

in price of different brands of drugs among private pharmacies and availability of free essential medicines for NCDs in public health facilities of eastern Nepal.

### METHODS

A survey was conducted in the year 2015-2016 in eastern Nepal. We looked for the availability of drugs for NCDs in public sector. Cost variability of drugs was studied in private pharmacies around the catchment areas of public health facility that included teaching, zonal and district hospitals. The study was conducted to look for availability of free essential drugs in public sectors. Price variability was studied in private pharmacies. Public facilities provide essential medicines free of cost so we couldn't look for the price variation of drugs for NCDs in public sector.

We studied availability of drugs for NCDs in setting closer to the community. Thus we randomly selected different public health facilities which are closer to the

DOI: <http://dx.doi.org/10.3126/jnhrc.v16i2.20295>

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community users. Private pharmacies in the catchment area of public hospital were also selected randomly proportionate to the bed strength of public hospital.

Drugs for treating cardiovascular and respiratory diseases were selected among NCDs for our study as these are considered the 2 major chronic diseases causing mortality in Nepal.<sup>9-10</sup> Thirty-three public health sectors and 18 pharmacies were included for the study. Mean price, maximum price, minimum price, percentage variation were calculated for different drugs used for treating NCDs using formula.<sup>11</sup>

Combinations and liquid formulations of drugs were not evaluated. Those drugs with only one brand were included but not analyzed. Inter-pharmacies variation in each individual drug was also evaluated.

## RESULTS

Eighteen pharmacies and 33 public health sectors randomly selected were surveyed. Seventeen were health posts (51.51%), 6 were PHCs (18.18%) and 10 were district hospitals (30.30%). We prepared a list of major drugs available in our country for treating NCDs (CVS and Respiratory diseases) from the book "NEPAL INDEX OF MEDICAL SPECIALITIES (NIMS)". There were 30 drugs in the book. Each drug was listed according to the available strength. Thirty-three different drugs were available on different strength and that made a total number of formulations to be eighty-nine.

Eighty-nine different formulations, variations between maximum and minimum priced brands of more than 100% was observed in 37 formulations and that of more than 200% in 22 formulations. Largest variation between maximum and minimum priced brands was shown by furosemide 40 mg tab (1536.36%), salbutamol 4 mg tab (1190.32%) and amlodipine 5 mg (806.49%). Furosemide 40 mg tab (607.61%) also had the highest variation of maximum price from average price followed by salbutamol 4 mg (238.55%) and telmisartan 20 mg tab (196.97%). The drug showing the largest variation of the minimum price from the average was salbutamol 4 mg tab (73.76%) followed by atorvastatin 10 mg tab (71.08%) (Table 1).

Our study also revealed inter-pharmacies variation of same drug. 37 formulations were found to have 100% variation between the maximum and minimum price of same drug in different pharmacies. The maximum inter-pharmacies price variation was seen in salbutamol 4 mg tab (300%) followed by enalapril 5 mg (201.2%), metoprolol 12.5 mg tab (200.75%), metoprolol 25 mg tab (200.43%) and amlodipine 2.5 mg tab (177.78%). Among the antihypertensive drugs the maximum price

variations in pharmacies was observed in enalapril 5 mg tab (200.12%) followed by metoprolol 12.5 mg (200.75%), metoprolol 25 mg tab (200.43%), amlodipine 2.5 mg (177.78%) another brand of enalapril 5 mg (162.23%). Similarly, among the drugs commonly prescribed for treating respiratory diseases, the inter-pharmacies price variation was found maximum to be 300% in salbutamol 4 mg tab. Commonly prescribed furosemide 40mg tablet had 81.82% variation in price among the pharmacies. Aspirin, the commonest antiplatelet prescribed for secondary prevention of cardiovascular disease, showed maximum inter-pharmacies variation of 140% in 75 mg tab and 114.29 % in 150 mg tab. Among the different lipid lowering agents, the maximum price variation in pharmacies was seen in rosuvastatin 10 mg tab (150.84%) and atorvastatin 20 mg tab (140%), followed by atorvastatin 10 mg tab (66.70%).

The another aim of the study was to look for the availability of free essential drugs provided by Government of Nepal (GoN) in public health sectors (Health Posts, Primary Health Care centers and District Hospitals). Government of Nepal has made provision to provide 36 free essential drugs in health Post among which the availability of 4 drugs (salbutamol, dexamethasone, atenolol and furosemide tab) for treating NCDs was observed. Similarly, among 58 free essential drugs for treating NCDs in primary health care centers, only 12 drugs were available. Out of 70 free essential drugs provided to district Hospital, 21 were available for treatment of NCDs. Out of 33 public health sectors, 17 were health posts (51.51%), 6 were PHCs (18.18%) and 10 were district hospitals (30.30%).

The most commonly available free essential drug was 4 mg salbutamol (88.57%) followed by furosemide 40 mg tab (82.8%), amlodipine 5 mg tab (81%), amitriptyline 10 mg tab (81%) and dexamethasone inj. 4mg/ml (72.15%). On the other hand the least available free essential drug was levothyroxine 5 mg (9.0%) and hydrochlorothiazide 25 mg (9.0%) followed by hydrocortisone 100 mg/vial (19.79%). The most commonly available free essential drug in health post was found to be furosemide 40 mg (94.1%) followed by salbutamol 4 mg (88.2%) and dexamethasone inj. 4mg/ml (76.5%). Most commonly available drug in PHCs was salbutamol 4 mg and atropine (100%) followed by furosemide 40 mg tab (83.3%) and dexamethasone inj. 2 mg/ml (83.3%). Most commonly available free essential drug in district hospital was salbutamol 4 mg tab (100%) followed by furosemide 40 mg tab (90%), amlodipine 5 mg tab (90%) amitriptyline 10 mg (90%) and dexamethasone inj. 4mg/ml (80%) (Table 2).

**Table 1. Price variation among brands of same molecule for Non-Communicable Diseases in Pharmacies (price rupees per tablet).**

Generic Name of drugs	Doses(mg)	Number of Brands	Mean price	Min. price	Max. price	(Dmin)*	Dmax †	%cost variation
Atenolol	25	10	2.35	1.2	4.5	48.95	91.45	275
	50	13	3.64	1.97	7.5	45.95	105.77	280.71
Metoprolol	12.5	7	4.13	1.33	10.48	67.82	153.6	687.97
	25	9	5.6	2.33	14.19	58.39	153.41	509.01
Propranolol	10	6	2.22	1	3	54.98	35.06	200
Amlodipine	2.5	19	3.1	1.3	7.34	58	137.15	464.62
	5	28	5.09	1.54	13.96	69.72	174.51	806.49
Enalapril	5	13	4.42	1.66	7.5	62.44	69.7	351.81
	10	10	7.05	3.25	13.33	53.9	89.1	310.15
Ramipril	5	5	11.02	5	16.16	54.62	46.68	223.2
Losartan	25	24	5.28	2.57	13.5	51.35	155.53	425.29
	50	25	9.32	4.15	13	55.47	39.51	213.25
Telmisartan	20	12	6.73	4.24	20	37.04	196.97	371.7
Hydrochlorothiazide	12.5	5	1.79	1	2.5	44.26	39.36	150
Isosorbide	10	5	2.79	1.9	5.09	31.83	82.62	167.89
Furosemide	40	9	1.27	0.55	9	56.76	607.61	1536.36
Digoxin(µm)	0.25	3	2.84	2.2	6	22.64	110.97	172.73
Aspirin	75	4	0.75	0.44	1.2	41.64	59.17	172.73
Clopidogrel	75	11	9.61	4.46	15.8	53.6	64.39	254.26
Warfarin	1	3	3.04	1.5	4.4	50.66	44.74	193.33
Atorvastatin	10	22	11.76	3.4	21.85	71.08	85.87	542.65
	20	23	21.09	6.56	32.64	68.9	54.74	397.56
Rosuvastatin	5	8	11.55	6	22	48.03	90.54	266.67
Salbutamol	4	4	1.18	0.31	4	73.76	238.55	1190.32

\*Dmin: minimum deviation from the mean value, † Dmax: maximum deviation from the mean value.

**Table 2. Availability of Free Essential Drugs in Public Health Sector of Eastern Development Region of Nepal.**

Generic name/dosage form/ strength	Number of Health Centers ( all of them are not health centres?) with drugs available			Total availability %
	Health Post(n=17)	PHC(n=6)	DH(n=10)	
Furosemide tab 40 mg	16(94.1%)	5(83.3%)	9(90%)	82.8
Furosemide inj.	NA	1(16.7%)	6(60%)	23.54
Amlodipine 5 mg	NA	NA	9(90%)	81
Dexamethasone inj. 4mg/ml	13(76.5%)	5(83.3%)	8(80%)	72.15
Salbutamol tab 4 mg	15(88.2%)	6(100%)	10(100%)	88.57
Aminophylline tab 100 mg	NA	3(50%)	6(60%)	31.87
Prednisolone 5/10 mg tab	NA	1(16.7%)	6(60%)	23.54
Phenobarbitone tab 60 mg	NA	NA	7(70%)	49
Alprazolam tab 0.25 mg	NA	2(33.3%)	8(80%)	44.15
Chlorpromazine tab 100 mg	NA	NA	7(70%)	49
Amitryptline tab 10 mg	NA	NA	9(90%)	81

Amitryptline tab 25 mg	NA	NA	5(50%)	25
Hydrocortisone 100 mg/vial	NA	2(33.3%)	5(50%)	19.79
Metformin Tab 500 mg	NA	3(50%)	7(70%)	40
Digoxin tab 0.25 mg	NA	NA	6(60%)	36
Diazepam inj. 2 ml	NA	2(33.3%)	7(70%)	34.79
Allopurinol tab 500 mg	NA	NA	5(50%)	25
Carbamazepine 200 mg	NA	NA	6(60%)	36
Carbamazepine 400 mg	NA	NA	7(70%)	49
Aspirin 75 mg	NA	NA	6(60%)	36
Aspirin 150 mg	NA	NA	6(60%)	36
Atenolol 50 mg	8(47.1%)	3(50%)	8(80%)	35.36
Atropine 0.6mg/ml	NA	6(100%)	7(70%)	68.125

## DISCUSSION

Our study is one of few studies of its kind which assess for inter-pharmacies variation of pricing at the consumer level on different cardiovascular and respiratory drugs. There was alarming inter-pharmacies variation of more than 100% in 37 formulations. This indicates failure of governmental surveillance in pharmacies in Eastern Nepal. Regulation must be in place to correct this.

Price variation of cardiovascular medicine was reported to be very high in a study done by Roy and Rewari. Although we found significant variation in price of medicine, it was much lesser than the study done by Roy and Rewari.<sup>12</sup> The difference in the methodology might have resulted in such discrepancies. While this study was carried out in the consumer level at different pharmacies, the former was based on the biblical data from Drugs Today. A study carried out in 2003 in randomly selected retail outlets in Kathmandu valley showed more than 50% price variation in 25 generics out of the total 34 generics studied.<sup>13</sup> In our study, done among different brands of medicines, out of 89 formulations, 57 formulations showed more than 50% price variation.

In another study, the cost of oral antihypertensive drugs available in Nepal were analysed. Percentage price variation of commonly used drugs: enalapril (5 mg) was 5300.00%, enalapril (2.5 mg) was 4150.00% and amlodipine (5 mg) was 962.50%,<sup>14</sup> while in our study the inter-pharmacy percentage variation of those drugs were less than the study by Shrestha, but was still more than 200%. Methodological approach might have resulted in the difference between two studies. However, as our study was at consumer level it reflects the actual cost of purchase by patients. Additionally, there may be change in price of drugs as the study time frame was different for the two studies.

Medicine to treat NCDs constitute minor portion of

essentials medicine categorized by GoN and made available in government health centers. In 2014 the number of these free essentials medicine for NCDs were increased to 4 at health post level, 12 in PHC, 22 in district hospitals by Ministry of Health and Population. However, the availability of free essential medicines in public sectors of Nepal is largely unknown. To the best of our knowledge, this is the first study in Eastern Nepal assessing its availability at the consumer level. So this study is expected to shed light on availability of free essential medicines in district and lower level public health sector. This may indirectly indicate effectiveness of demand supply chain and expected to reflect policies of GoN regarding the provision and availability of free essential medicines to public.

The median availability of free essential medicines in public sector ranged from 9% to 88.57% while the similar study done in public sector of India showed the median availability of medicines ranging from 0% to 30%.<sup>15</sup> Among anti-platelet drugs, the overall availability of aspirin in public health sector of Nepal is less than 50%. Srilankan had better availability (78%) of aspirin (300mg) in public sector. Availability and use of aspirin may have significant impact in the cardiovascular health of the population. Aspirin has a long track record for use in secondary prevention of cardiovascular disease. Nepal is witnessing rapid rise in cardiovascular disease and availability and use of aspirin may help in reducing recurrence of cardiovascular events.<sup>8</sup> The same study done in Srilanka found out the availability of salbutamol MDI to be 55.6% in the public sector while our country has not included this widely prescribed reliever drug for acute asthma in the list of free essential medicines. On the other hand the salbutamol tablet is included in the list of essential medicine. Mean availability of salbutamol 4 mg tablet to be 88.57% which is still lower compared to 95.6% mean availability in public sector of Srilanka.<sup>16</sup>

Hydrochlorothiazide (HCT) is cheap antihypertensive drug proven to be effective in hypertension.<sup>17</sup> However, a study done in six low and middle income countries including Nepal observed that the median availability of HCT varied from 0 to 10%,<sup>8</sup> which is also reflected in our study. Unavailability of this cheap and effective medicine has two consequences. Patient buys it from private sector having wide variability of price of same molecule. On the other hand, physician may prescribe some other antihypertensive which are costlier than HCT. HTN is a silent killer and accounts for significant proportion of cardiovascular deaths.<sup>18</sup> Control of hypertension largely prevents target organ damage related to HTN. Anti-hypertensive therapy is the cornerstone for the treatment of HTN.<sup>19</sup> Non-availability of anti-hypertensive drugs in public sector may lead to the rise in hypertension related complications.<sup>20</sup>

## CONCLUSIONS

Present study serves to highlight the variation of price of drugs for treating non-communicable diseases and availability of free essential medicines in public health sector of Eastern Nepal. Our study shows there is considerable variation in price of same drug in different pharmacies which has greater impact on general population of developing countries like Nepal where people have to pay out of their pocket due to lack of health insurance coverage. Overall availability of free essential medicines is low in public sector at the time frame of study. These facts may make management of NCDs more difficult in Nepal.

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