Shandong Province, China

Medicine prices, availability, affordability and price components

Medicine prices matter

Rapidly rising costs of health care and high medicine prices are a growing concern worldwide, especially in developing countries where patients often have to pay the full price of medicines. This brief report about medicine prices and availability in Shandong Province, China is one of a series of papers summarizing the results of medicine price and availability surveys carried out around the globe using a standard survey methodology developed by the World Health Organization and Health Action International[1].

This survey was conducted in 2004 by the Center for Health Management and Policy, Shandong University, Jinan, Shandong – using a group of 24 medicines with pre-set dosage forms, strengths and recommended pack sizes, relevant to the global burden of disease, plus 15 selected medicines of national importance.

This survey found that in Shandong Province:

- Availability of essential medicines was low in the public and private sectors
- Courses of common treatments for chronic diseases were unaffordable to a low paid person
- Originator brand and generic equivalents were being procured and supplied in the public and private sectors; some originator brands were equally or more available than generic equivalents
- Public sector patient prices were 21% higher for originator brands and 75% for generics than public sector procurement prices
- Originator brands are many times more expensive than generic equivalents – up to 75 times more for diclofenac
- Medicines obtained from the public sector are more expensive than those from the private sector, especially for generics where prices were 31% lower in the private sector
- Mark-ups are higher in the public sector at 24-35% compared to the private sector at 11-33%

Shandong Province

Shandong Province is in the eastern part of China with a population of nearly 0.1 billion people. The GDP per capita in 2002 was 11643 Chinese Yuan, but the distribution is very uneven. Shandong Province has 17 cities with Jinan as the capital; there are 139 counties and 1978 towns in Shandong.

There are at least 2 public hospitals in each county and 1 public health centre in each town. Following the establishment of the Urban Employee Basic Health Insurance System in China in 1999, private retail pharmacies developed quickly to 200,000 in 2003, including 1,216 chain pharmacies. Some retail pharmacies were selected as the targeted pharmacies of the social health insurance scheme. In Shandong the number of retail pharmacies is about 12,000; 1,200 are in Jinan.

The pharmaceutical market has developed quickly in the last decades. Western medicines account for about 174.8 billion Yuan (U$21 billion) in 2004.

In 2004, the share of drug expenditure to outpatient's health expenditure in general public hospitals was about 53%; the proportion for inpatient expenditure was about 44% (China Pharmaceutical Economy Net), and most health expenditure was paid out-of-pocket. In 2003, the total health expenditure in China was 658.4 billion Yuan ($80 billion); the proportion of out-of-pocket health expenditure was about 56 %.

Since 2000, two pricing methods have been applicable: government pricing and market pricing. The government sets the price of medicines on the Essential Medicine List and some special medicines used in mental health, anesthetics, immunization medicines, and family planning medicines. Prices of other medicines are set by the market: including the manufacturer's selling price, wholesaler price and retail price. However, the price has to be registered with the government price authority. The government has abolished the setting of mark-ups in the distribution chain. For the price of medicines set by government, the SPDC sets a maximum retail price, leaving retail pharmacies and public hospitals to set their own retail price – which cannot be higher than the maximum retail price. For medicines whose price is set by manufacturers, the retail price is based on production

[1] WHO/HAI. Medicine prices: a new approach to measurement, Geneva, World Health Organization, 2003. http://haiweb.org/medicineprices/

World Health Organization

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costs, market supply and demand. Wholesalers, retail pharmacies and hospitals can set the actual selling price but it cannot exceed the retail price set by the manufacturer. Mark-ups charged in the distribution chain are generally regarded as commercial secrets. Usually the mark-up of wholesalers to hospitals is not fixed, and depends on sales volume. Because of this process of negotiation between wholesalers and public hospitals, the procurement price of the same product may be different in different hospitals (and hence the final patient price can also vary).

Medicine price & availability survey

The study was designed to answer the following questions:

- What are the prices people pay for originator brands and generic equivalents in the public sector and private sector?
- What is the availability of the medicines surveyed in each sector?
- What price is the government paying for medicines and how does this compare with the price the patient pays?
- Do prices and availability vary in different counties of Shandong Province?
- What price components (e.g. taxes, mark-ups) make up the final patient price?
- How affordable are standard treatments for ordinary citizens in Shandong, China?

A total of 39 medicines were surveyed in October and November 2004; 24 from the WHO/HAI core list and 15 supplementary medicines. For each medicine, price and availability were recorded for the originator brand product (OB) and the lowest priced generic equivalent (LPG) which was determined at each facility. Of the 39 medicines, 24 are on the Essential Medicine List of the Social Health Insurance issued by the Ministry of Labor and Social Security, 2000.

Patient price and availability data was collected from a total of 20 public sector facilities (public hospitals) and 20 private retail pharmacies in Jinan, and three other counties with different economic development - Zhangqiu, Jinxiang and Ciping.

In Jinan, procurement prices were obtained from the Pharmaceutical Centralized Public Bidding Office; in the other three counties, procurement prices were obtained from each of the hospitals surveyed (as there was no centralized public bidding in these regions).

Medicine price components were surveyed in the capital Jinan in order to reveal mark-ups and other charges in the distribution chain.

Table 1. Measurements in each sector.

Measurement	Public sector	Private sector
Price to patient	✔	✔
Availability	✔	✔
Affordability	✔	✔
Procurement price	✔	
No. of facilities visited	20	20

Presentation of price information

The WHO/HAI survey methodology presents prices as median price ratios (MPR). The MPR is calculated by dividing the local price by an international reference price (converted to local currency). An MPR of 1 means the local price is equivalent to the reference price whereas an MPR of 2 means the local price is twice the reference price. The international reference prices used for this survey were taken from the 2003 Management Sciences for Health (MSH) *International Medicine Price Indicator Guide* [2] (the MSH Guide pulls together information from recent price lists of large generic medicine suppliers and thus reflects the prices governments could be expected to pay for medicines); use of reference prices facilitates international comparisons. MSH 2003 prices were not available for 15 of the 39 medicines surveyed. However, availability was assessed for all 39 medicines.

Interpretation of findings

Country specific factors such as pricing policies; market size; competition; national economic and other factors may influence prices. For the purposes of these surveys, in a low or middle income country an MPR of less than or equal to 1 for public sector procurement prices and public sector patient prices are considered to indicate acceptable (not excessive) prices.

In terms of availability, during the survey it was realized that the strength of the medicines surveyed from the core list were not always the most frequently used in China e.g. atenolol 50mg is on the core list of medicines but data collectors reported the 25mg being more commonly available. This accounts for the low availability of some medicines – however 24 of the 39 medicines were on the national essential medicines list in the strength surveyed.

[2] http://erc.msh.org

Affordability

Affordability is calculated as the number of days the lowest paid unskilled government worker would have to work to pay for a treatment course for an acute condition or one month's treatment for a chronic condition. At the time of the survey, the lowest paid unskilled government worker earned 13.33 Chinese Yuan (US$ 1.62) per day. Having to spend more than 1 day's income per month on family medicine needs is considered by some as unaffordable. Table 2 demonstrates how many days this worker would have to work to purchase various treatments.

Overall, a low paid unskilled government worker would generally need 0.3 - 0.6 days wages for treatment of acute diseases such an acute respiratory infection with lowest priced generics. Treatment cost of chronic conditions ranged between a few hours and 23.2 days when using lowest priced generics; or 2.7 – 51 days wages if purchasing originator brand products – depending upon condition, medicine choice, and where purchased from.

Should this low paid worker need treatment for hypertension, arthritis and a peptic ulcer, then they will need 1 - 50 days wages to purchase 30 days supply of medicines [3] – depending upon the choice of medicine, where it was obtained, and whether brand or generic. As the person and family members often have a number of conditions requiring treatment, even purchasing lowest priced generics generally requires a significant proportion of income to be spent.

Table 2. Affordability: number of days' wages.

		Public	Private
Hypertension			
amlodipine	OB LPG	14.6 10	14.3
captopril	LPG	0.2	0.1
hydrochlorothiazide	LPG	<0.1	<0.1
losartan	OB	17.1	16.4
nifedipine retard	LPG	3.6	3.4
Asthma			
beclometasone inhaler	OB	3.2	3.2
salbutamol inhaler	OB LPG	2.7	2.8 0.4
Ulcer			
omeprazole	OB LPG	28.1 3.9	28.9 1.8
ranitidinranitidine	LPG	0.6	0.4
Diabetes			
metformin	OB		10.8
rosiglitazone	OB	28.9	25.7
Depression			
fluoxetine	OB LPG	23.2	51.4
Arthritis			
diclofenac	OB LPG	4.5	4.1 0.1
Respiratory tract infection (adult)			
amoxicillin (7 days)	LPG	0.3	0.6

Public sector procurement prices

Both originator brands and generics were procured; and the same medicine was often procured in originator and generic equivalent versions. Procurement prices for the 9 originator brands were 6.3 times (530% more than) the international reference price, with 50% of the medicines in the range of 1.8 – 9.6 times: which ranged from 0.8 times (20% less) for losartan to 39 times for fluoxetine. Procurement prices for the lowest priced generic equivalents were 0.6 times (40% less) the international reference price with 50% of the medicines in the range of 0.3 – 3.1 times: which ranged from 0.1 times for ceftriaxone to almost 12 times for fluoxetine (Table 3)

Table 3. Number of times more expensive: public sector procurement prices compared to international reference prices.

	Originator brand	Lowest priced generic
Median MPR *(interquartile range)*	6.3 *(1.8 - 9.6)*	0.62 *(0.3 - 3.1)*
Minimum	0.8	0.1
Maximum	39.1	11.8
No. of medicines	9	15

Across the 6 medicines procured in the public sector in both originator and generic equivalent forms, originator brands were 1.7 times the price of the lowest priced generics.

Table 4 presents 8 medicines where procurement prices were high for originator brands and generics – as well as those where there is a large price difference between originator and lowest priced generics. For example, originator and generic fluoxetine were 39 and almost 12 times the international reference price respectively – and originator brand ceftriaxone injection was almost 35 times (3,400% more) the price of the generic equivalent.

[3] One antihypertensive (amlodipine, captopril, hydrochlorothiazide, losartan, or nifedipine retard); diclofenac for arthritis, and one ulcer healing medicine (omeprazole or ranitidine)

Table 4. Number of times more expensive: public sector procurement prices compared to international reference prices.

	OB	LPG	Ratio OB: LPG
carbamazepine	6.30		
ceftriaxone inj.	4.87	0.14	34.8
diclofenac	18.22	7.80	2.3
fluoxetine	39.14	11.85	3.3
lovastatin		2.78	
metformin	9.61	8.23	1.2
nifedipine retard		3.48	
omeprazole	6.65	0.62	10.7

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Public sector patient prices

Both originator brands and generics were available; and in some facilities the same medicine was available in both originator and generic equivalent versions. Patient prices for originator brands were 4.1 times (310% more) the international reference price, with 50% of the medicines in the range of 1.7 – 7.3: which ranged from 1.0 times for losarten to almost 24 times for diclofenac. Patient prices for the lowest priced generic equivalents were 0.9 times (10% less) the international reference price with 50% of the medicines in the range of 0.7 – 2.9 times: which ranged from 0.2 times (80% less) for captopril to 21 times for fluoxetine (Table 5).

Table 5. Number of times more expensive: public sector patient prices compared to international reference prices.

	Originator Brand	Lowest priced generic
Median MPR *(interquartile range)*	4.09 *(1.7 -7.3)*	0.93 *(0.7 – 2.9)*
Minimum	1.0	0.2
Maximum	23.6	21.3
No. of medicines	6	10

Figure 1 and table 6 presents medicines where patient prices were high for originator brands and generics – as well as those where there is a large price differences between the originator and generic equivalents. For example, originator brand diclofenac and generic fluoxetine were both over 20 times the international reference price, and originator brand ceftriaxone injection was almost 18 times (1,700% more) the price of the lowest priced generic equivalent.

Figure 1. Number of times more expensive: patient prices in the public sector compared to international reference prices.

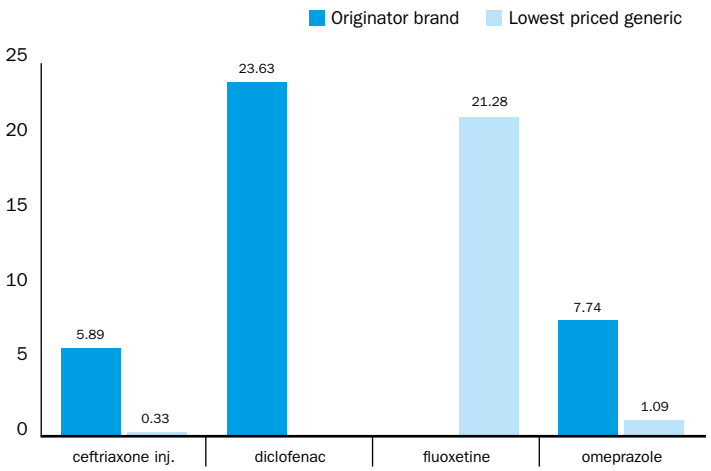

Table 6. Number of times more expensive: public sector patient prices compared to international reference prices.

	OB	LPG	Ratio OB: LPG
ceftriaxone inj.	5.89	0.33	17.8
diclofenac	23.63		
fluoxetine		21.28	
lovastatin		3.36	
nifedipine retard		4.51	
omeprazole	7.74	1.09	7.1
salbutamol inhaler	2.29		

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There were only 2 medicines found in the public sector in both originator and generic forms originator brands. The 2 originator brands were 7.1 and 17.8 times the price of their lowest priced generic equivalents.

Public sector availability

Overall availability of the surveyed medicines in the public sector on the day of data collection was poor. The median availability of lowest priced generics was 5% and for originator brands, 0% (Table 7). The median availability of all EDL medicines surveyed was only 10%.

Table 7. Availability in the public sector.

	Originator brand	Lowest priced generic
Median availability *(interquartile range)*	0% *(0 - 15%)*	5% *(0 - 20%)*

Tables 8 and 9 present the availability of originator brand and generic equivalent versions respectively - for each medicine in the public sector.

Originator brands versions of 16 medicines were found (out of 39 medicines surveyed) in at least one clinic – however availability was very low; the originator brand of diclofenac had the highest availability at 45%. For generics, the availability was slightly higher but still poor – 21 medicines were available in at least one public facility in generic form. Only 4 medicines were found in 80% or more public sector facilities – captopril, amoxicillin, ceftriaxone injection and hydrochlorothiazide.

Table 8. Availability of originator brands in the public sector.

Availability	Medicine
Not found	aciclovir, amitrityline, amoxicillin, atenolol, azithromycin, candesartan, captopril, ciprofloxacin, co-trimoxazole susp, diazepam, efavirenz, erythromycin, esomeprazole, ganciclovir inj, glibenclamide, hydrochlorothiazide, lisinopril, lovastatin, nifedipine retard, ofloxacin, phenytoin, ranitidine, stavudine
1- 20%	atorvastatin, carbamazepine, ceftriaxone inj, celecoxib, fluconazole, fluoxetine, losartan, metformin, olanzapine, salbutamol inhaler
21 - 50%	amlodipine, diclofenac, omeprazole, rosiglitazone, simvastatin beclometasone inhaler
Over 50%	none

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Table 9. Availability of lowest priced generics in the public sector.

Availability	Medicine
Not found	aciclovir, atenolol, azithromycin, beclometasone inhaler, candesartan, carbamazepine, celecoxib, ciprofloxacin, co-trimoxazole susp, efavirenz, esomeprazole, fluconazole, lisinopril, losartan, olanzapine, rosiglitazone, stavudine, ofloxacin
1-20%	amitriptyline, amlodipine, atorvastatin, diazepam, diclofenac, erythromycin, fluoxetine, ganciclovir inj, glibenclamide, metformin, salbutamol inhaler, simvastatin
21-50%	lovastatin, nifedipine retard
51-79%	ranitidine, phenytoin, omeprazole
≥ 80%	amoxicillin, captopril, ceftriaxone inj, hydrochlorothiazide

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Private sector patient prices

In the private sector, patient prices of originator brands were 7.1 times the international reference prices, with 50% in the wide range of 2.3 – 10.9 times: which ranged from 0.9 times for losartan to 47 times for fluoxetine. Prices of lowest price generics were 0.5 times (50% less) the international reference price, with 50% of the medicines in the range of approximately 0.3 – 1.1 times: which ranged from 0.15 (85% less) for captopril to almost 4.1 times for nifedipine retard (Table 10).

Table 10. Number of times more expensive: patient prices in the private sector compared to international reference prices.

	Originator Brand	Lowest priced generic
Median MPR *(interquartile range)*	7.14 *(2.3 - 10.9)*	0.51 *(0.3 - 1.1)*
Minimum	0.9	0.15
Maximum	47.2	4.1
No. of medicines	9	11

Figure 2 and table 11 presents 9 medicines where patient prices were high for originator brands and generics – as well as those where there is a large price difference between the originator and generic equivalents. For example originator brand fluoxetine was 47 times the international reference price – and originator brand diclofenac was almost 75 times (7,400% more) the price of the lowest priced generic equivalent.

Figure 2. Number of times more expensive: patient prices in the private sector compared to international reference prices.

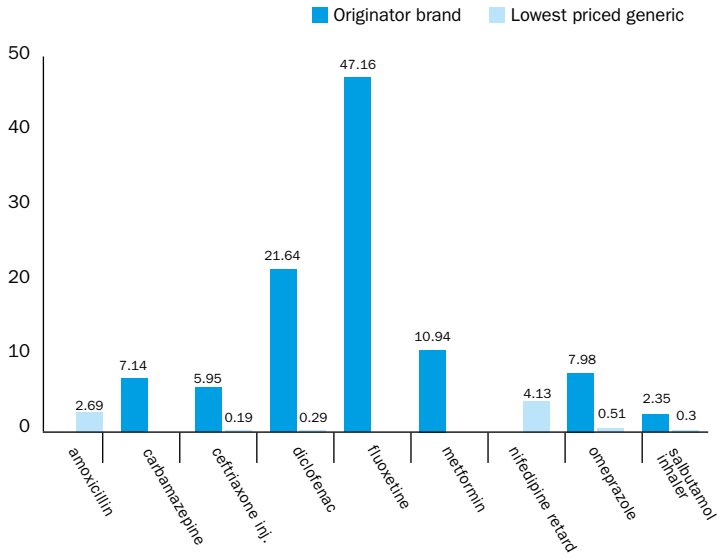

Table 11. Number of times more expensive: private sector patient prices compared to international reference prices.

	OB	LPG	Ratio OB: LPG
amoxicillin		2.69	
carbamazepine	7.14		
ceftriaxone inj.	5.95	0.19	31.3
diclofenac	21.64	0.29	74.6
fluoxetine	47.16		
metformin	10.94		
nifedipine retard		4.13	
omeprazole	7.98	0.51	15.6
salbutamol inhaler	2.35	0.3	7.8

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There were only 4 medicines found in the private sector in both originator and generic forms. The 4 originator brands were 7.8 – 74.6 times the price of their lowest priced generic equivalents.

Private sector availability

As shown in Table 12, the median availability of originator brands in private pharmacies was 0%; generics were also not widely available at only 5%. The median availability of all EDL medicines surveyed was only 10%.

Table 12. Availability in private sector.

	Originator brand	Lowest priced generic
Median availability *(interquartile range)*	0% *(0 - 15%)*	5% *(0 - 20%)*

Tables 13 and 14 present the availability of originator brand and generic equivalent versions respectively for each medicine in the private sector – the pattern was very similar to that in the public sector (tables 8 and 9).
Seventeen originator brands were found in at least one private pharmacy – only one had good availability; diclofenac at 85% (Table 13). For generics, there were 18 medicines where no generic versions were found. Availability was good only for 5 medicines - amoxicillin, hydrochlorothiazide, omeprazole, ranitidine (100%) and captopril (100%).

Table 13. Availability of originator brands in the private sector.

Availability	Medicine
Not found	amitrityline, amoxicillin, atenolol, candesartan, captopril, ciprofloxacin, co-trimoxazole susp, diazepam, efavirenz, erythromycin, fluconazole, ganciclovir inj, glibenclamide, hydrochlorothiazide, lisinopril, lovastatin, nifedipine retard, ofloxacin, olanzapine, phenytoin, ranitidine, stavudine
1- 20%	aciclovir, atorvastatin, azithromycin, ceftriaxone inj, esomeprazole, fluoxetine, metformin, salbutamol inhaler
21 - 50%	amlodipine, beclometasone inhaler, carbamazepine, celecoxib, losartan, omeprazole, rosiglitazone, simvastatin
51-79%	none
≥ 80%	diclofenac

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Table 14. Availability of generics in the private sector.

Availability	Medicine
Not found	atorvastatin, azithromycin, beclometasone inhaler, candesartan, carbamazepine, celecoxib, ciprofloxacin, co-trimoxazole susp, efavirenz, fluconazole, fluoxetine, ganciclovir inj, losartan, metformin, olanzapine, rosiglitazone, stavudine, simvastatin
1-20%	aciclovir, amitriptyline, amlodipine, atenolol, diazepam, erythromycin, esomeprazole, glibenclamide, lisinopril, ofloxacin, salbutamol inhaler
21-50%	diclofenac, lovastatin, phenytoin
51-79%	ceftriaxone inj, nifedipine retard
≥ 80%	amoxicillin, captopril, hydrochlorothiazide, omeprazole, ranitidine

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Inter-sectoral comparison

Overall public sector patient prices were 21.6% and 75.4% higher than the public sector procurement prices for the 6 common originator and 10 common generic equivalents respectively.

Overall patient prices for the 9 common generic medicines in the public sector were 31.8% higher than in the private sector; for the 6 common originator brands there was only a 1.6% difference in price between the two sectors.

Availability was low in both sectors for both originator and generic equivalent versions. The median availability of all EDL medicines surveyed was only 10% in the public and private sectors.

The following medicines were not found at all in either originator or generic versions: candesartan, ciprofloxacin, co-trimoxazole suspension, efavirenz, and stavudine; and the following found in less than 10% of the public and private outlets: atenolol, azithromycin, fluconazole, ganciclovir inj, glibenclamide, lisinopril, ofloxacin and olanzapine.

During the survey, it was realized that the strength of the medicines surveyed from the core list were not always the most frequently used in China e.g. atenolol 50mg is on the core list of medicines, but data collectors reported the 25mg being more commonly available. This will be the reason for some of the low availability – however 24 of the 39 medicines were included (in the same strengths) on the national essential medicines list.

Price components

Cumulative mark-ups (from the manufacturer's price to the patient price) were 24-35% in the public sector, and 11-33% in the private sector.

Wholesale mark-ups: A 2-3% mark-up from wholesaler to retailer in the private sector is generally less than the mark-up observed in the public sector (up to 13%). The main reason is a government policy that restricts medicine manufacturers from supplying medicines directly to public hospitals. Most of the medicines in public hospitals are procured from provincial, prefecture and county wholesalers, and the trade costs (which includes transportation, sales commission fee etc) between wholesalers and public hospitals are higher. Usually trade costs are paid by wholesalers as part of their mark-up to public hospitals.

Retail mark-ups: In the public sector, mark-ups of around 14 -26% were observed. In the private sector, mark-ups of 4.5 - 26% were observed.

Taxes: A business tax of 3% is applied in the private sector. VAT and customs duty on imported medicines could not be verified.

Recommendations of the investigators

- To improve access to medicines, patients should pay procurement prices in the public sector plus a nominal distribution cost. Hospitals should not be financed by medicine sales but through other mechanisms. Sales tax should be removed in the private sector.
- The centralized public bidding mechanism (tender) for medicines should be further strengthened, and generics purchased in order to decrease medicine prices in the public sector.
- VAT and other taxes should be removed for imported medicines.
- Greater acceptance and use of generic medicines (by health professionals and consumers) must be encouraged.
- Carry out an extended and more customized survey to get a more comprehensive picture of medicine prices, availability, affordability and charges in the distribution process - especially looking at factors influencing the purchasing and selling behaviour of wholesalers, and the setting of the manufacturer's selling price and the maximum patient price.
- The impact of policy changes should be measured by establishing a monitoring system to regularly monitor the price, availability and affordability of medicines.

Further information

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The full survey report and data can be found at:
www.haiweb.org/medicineprices