

Shanghai China

Medicine prices, availability and affordability

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 Shanghai, 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 International¹.

This survey was conducted in 2006 by the Department of Health Economics, School of Public Health, Fudan University, Shanghai using a group of 19 medicines - with pre-set dosage forms, strengths and recommended pack sizes - relevant to the global burden of disease, plus 22 selected medicines of national importance.

This survey found that in Shanghai:

- For those paying out-of-pocket, medicines were not affordable for common conditions especially chronic diseases such as hypertension and diabetes
- Overall patient prices were the same in the public and private sectors, at 5.6 - 8.8 times international reference prices for originator brands and 1.8 - 2.0 times for lowest priced generic equivalents
- Public sector patient prices were 31-34% more than public sector procurement prices
- There was low availability of medicines in the public and private sector – even for common medicines and medicines on the national essential medicine list
- The public sector was procuring and selling both originator brands and generic equivalents of the same medicine in the same facility
- Originator brands were about 2.5 times the price of generic equivalents in both sectors – although this was up to almost 14 times for some medicines
- The public sector had greater availability of generics compared to originator brands

Shanghai

Shanghai is in the eastern part of China with a population of nearly 16 million people. There are 16 districts and 4 counties in Shanghai. In 2005, the GDP per capital was 59,600 Yuan Renminbi (RMB) (US\$ 7,450). In the same year the health status of the Shanghai population almost reached the average level for developed countries; the average life expectancy was 80.3 years

old. The infant mortality rate, in continuous decline, was 3.78 per 1,000 live births. Because of the high life expectancy and low infant mortality rate, the ageing population has become problematic in Shanghai. Table 1 presents the top 10 causes of death.

Table 1. Top 10 causes of death in descending order Shanghai (2005).

Cause of death
1. Circulatory system
2. Cancer
3. Respiratory system
4. Injury
5. Internal system
6. Digestive system
7. Communicable disease including parasitic conditions
8. Psychosis
9. Urological and reproductive systems
10. Nervous system

In 2005 there were 428 hospitals in Shanghai, of which 33 are tertiary hospitals, 130 are secondary hospitals and 227 are community health centers. There is at least 1 community health center in each community. Private retail pharmacies have developed quickly. In Shanghai the number of retail pharmacies is about 2,591, of which 1,756 are chain stores. Some retail pharmacies have been selected as the target pharmacies of the social health insurance scheme.

The Urban Employee Basic Health Insurance System was established in China in 1999. By 2004, 7.9 million employees have joined the insurance scheme; another 2.34 million are part of the rural cooperative medical scheme; and 587,000 participate in the “township social insurance scheme”, which is specially designed for farmers who have lost their land. Two-thirds of the medical insurance beneficiaries are elderly, and 25% of retirees spend almost 60% of the total health insurance fund.

Medical costs are shared by the employing units, who pay a contribution equivalent to 10% of their total payroll, and individuals, who pay 2% of their wages. Retirees are not required to pay a medical insurance contribution. Contributions are divided into a pool of funds and individual accounts. All individual contributions, and 30% of the contribution paid by employing units, are put into the individual account and the rest is put into

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

the pool of funds. The individual accounts are used to pay the medical costs of the individuals for minor diseases, while the pool of funds covers hospitalization and serious illness. Costs exceeding a maximum threshold (about four times workers' annual average wages in respective localities) are covered by supplementary insurance. The prices of medicines on the national essential medicines list are set by the Government and are perceived to be low – which has reportedly resulted in a reduced interest for their manufacture.

Shanghai is one of the cities in China where a bulk purchasing policy for medicines is implemented. In the past 4 years, 80% of pharmaceuticals purchased by hospitals and 75% purchased by health insurance companies were procured through bulk purchasing. Medicines procured through pooled purchasing account for 80% of usage in ambulatory and emergency departments. Because medicine procurement is predominantly unified and decided by the government, the effect of competition and price cutting is significant. In addition, a policy of budget control on pharmaceutical expenditure was adopted in Shanghai in 2004. Purchasing and utilization of high-price medicines is not permitted beyond 30% of total medicine expenditure in tertiary hospitals, 20% in secondary hospitals and 5% in community hospitals, respectively.

80% of medicines are prescribed in hospitals and as public sector facilities are permitted to earn a profit of 15% from the sale of medicines, there are incentives to prescribe more, to prescribe more expensive medicines, and to encourage patients to buy the medicines from the facility. Therefore, few patients buy prescription medicines from private pharmacies where the sale of over-the-counter medicines has become the main source of income.

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 and how do these prices differ between the public sector and the private sector?
- What price is the government paying for medicines and how does this compare with the price the patient pays?
- How do local prices compare to international reference prices?
- What is the availability of the medicines surveyed in each sector?
- Does prices and availability vary in different districts of Shanghai?
- What markups are applied in the supply chain?
- How affordable are standard treatments for ordinary citizens in Shanghai?

A total of 41 medicines were surveyed in September to November 2006; 19 from the WHO/HAI core list and 22 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.

Patient price and availability data was collected from a total of 30 public sector facilities (public hospital clinics) and 20 private retail pharmacies in Shanghai city plus four districts; Xuhui, Zhabei, Putuo and Huangpu.

Although public procurement prices are determined by the Department of Medicine Price Bidding, Municipal of Health Bureau, Shanghai, public health facilities always negotiate directly with pharmaceutical companies in an attempt to obtain lower prices than the government bidding prices. As such, in order to obtain the actual procurement price, we surveyed each of the hospitals (procurement data analysis is based on 18 hospitals).

Table 2. Measurements in each sector.

Measurement	Public sector	Private sector
Price to patient	✓	✓
Availability	✓	✓
Affordability	✓	✓
Procurement price	✓	
No. of facilities visited	30	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 2005 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 comparison.

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.

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 25 RMB Yuan (US\$ 3.13) per day. Having to spend more than 1 day's income per month on family medicine needs is considered by some as unaffordable. Table 3 demonstrates how many days this worker would have to

² <http://erc.msh.org>

work to purchase various treatments. Overall, a low paid unskilled government worker would generally need 0.3 - 0.9 days wages for treatment of acute diseases such as acute respiratory infection – depending on medicine choice. Treatment cost of chronic conditions ranged between 0.4 - 12 days when using lowest priced generics; or 1.4 – 28.8 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 would have to use 3 – 27.3 days of salary every month to purchase the medicines³ for a month – depending upon the choices 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 requires a significant proportion of income to be spent.

Table 3. Affordability: number of days’ wages.

Hypertension		Public	Private
amlodipine	OB	8.1	8.1
	LPG	4.7	4.3
captopril	LPG	0.4	0.2
hydrochlorothiazide	LPG	<0.1	<0.1
losartan	OB	9.8	9.8
Hypercholesterolaemia			
lovastatin	LPG		3.3
simvastatin	OB	10.2	10.2
	LPG	5.2	
Asthma			
beclometasone inhaler	OB	1.8	1.8
salbutamol inhaler	OB	1.4	1.4
	LPG	0.9	0.7
Ulcer			
omeprazole	OB	15.1	15.1
	LPG	3.6	3.3
ranitidine	LPG	0.4	0.4
Diabetes			
glicazide	OB	4.7	4.4
	LPG	2.3	1.7
metformin	OB	5.9	5.1
	LPG	1.1	
Depression			
amitriptyline	LPG	0.7	
fluoxetine	OB	28.8	28.4
	LPG	12	12
Arthritis			
diclofenac	OB	2.4	2.4
Respiratory tract infection (adult)			
ciprofloxacin (5 days)	LPG	0.2	0.2
amoxicillin (7 days)	LPG	0.9	0.9

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³ One antihypertensive (amlodipine, captopril, or losartan); diclofenac for arthritis, and one ulcer healing medicine (omeprazole or ranitidine).

Public sector procurement prices

Both originator brands and generics were procured; and the same medicine was often procured in originator and generic equivalent versions in the same facility. Procurement prices for the 14 originator brands were 5.5 times (450% more than) the international reference price, with 50% of the medicines in the range of 1.8 – 8.7 times: which ranged from 1.0 times for simvastatin to 54 times for fluoxetine. Procurement prices for the lowest priced generic equivalents were 1.6 times (60% more than) the international reference price with 50% of the medicines in the range of 1.0 – 3.2 times: which ranged from 0.29 times for cefradine injection (about 70% less) to 22 times (2100% more) for fluoxetine (Table 4)

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

	Originator brand	Lowest priced generic
Median MPR (interquartile range)	5.48 (1.8 - 8.7)	1.52 (1.0 - 3.2)
Minimum	1.0	0.29
Maximum	54.12	22.08
No. of medicines	14	25

Across the 10 medicines procured in the public sector in both originator and generic equivalent forms, originator brands were 4.2 times the price of the lowest priced generics.

Table 5 presents 11 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 and generic fluoxetine were 54 and 22 times the international reference price respectively – and the price of originator brand ceftriaxone injection was almost 14 times (1,300% more) that of the lowest priced generic equivalent.

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

	OB	LPG	Ratio OB: LPG
amlodipine	4.26	2.36	1.8
amoxicillin		3.72	
carbamazepine	6.7		
ceftriaxone inj.	8.55	0.62	13.8
cimetidine	8.22		
fluconazole		9.38	
fluoxetine	54.12	22.08	2.5
loratadine	16.41	10.10	1.6
lovastatin		4.87	
metformin	8.82	1.61	5.5
omeprazole	22.02	4.75	4.6

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Public sector patient prices

Both originator brands and generics were available; and the same medicine was often available in originator and generic equivalent versions in the same facility. Patient prices for originator brands were 5.6 times (460% more) the international reference price, with 50% of the medicines in the range of 2.6 – 10.8: which ranged from 1.3 times for simvastatin to 69 times for fluoxetine. Patient prices for the lowest priced generic equivalents were double (100% more) the international reference price with 50% of the medicines in the range of 1.2 – 4.2 times: which ranged from 0.3 times (70% less) for cefradine to almost 29 times for fluoxetine (table 6).

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

	Originator Brand	Lowest priced generic
Median MPR (interquartile range)	5.64 (2.6 - 10.8)	2.03 (1.2 - 4.2)
Minimum	1.28	0.34
Maximum	69.45	28.94
No. of medicines	21	29

Figure 1 and table 7 presents 10 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 and generic fluoxetine were 69 and 29 times the international reference price respectively – and originator brand ceftriaxone injection was almost 11 times (1,000% more) the price of the generic equivalent.

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

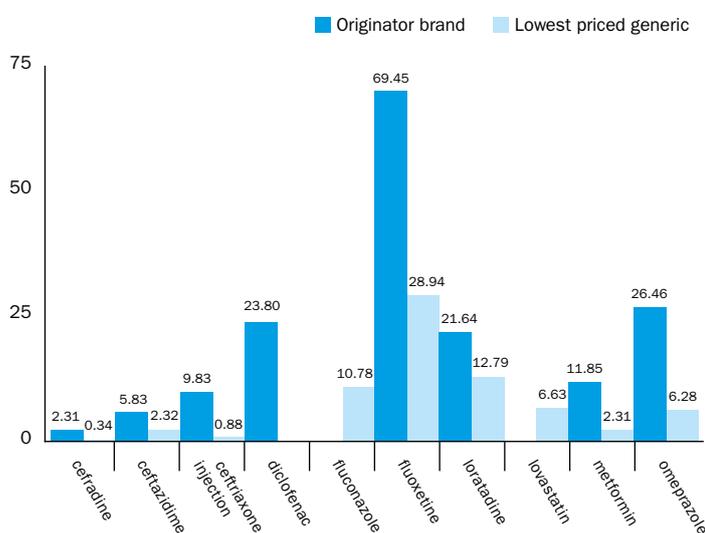


Table 7. Number of times more expensive: public sector patient prices compared to international reference prices.

	OB	LPG	Ratio OB: LPG
cefradine	2.31	0.34	6.8
ceftazidime	5.83	2.32	2.5
ceftriaxone injection	9.83	0.88	11.2
diclofenac	23.80		
fluconazole		10.78	
fluoxetine	69.45	28.94	2.4
loratadine	21.64	12.79	1.7
lovastatin		6.63	
metformin	11.85	2.31	5.1
omeprazole	26.46	6.28	4.2

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For many medicines, prices did not vary widely between outlets, however for some medicines the variation was much wider – table 8 demonstrates that aciclovir has a much narrower price variation – demonstrated by a small difference between the 25th and 75th percentiles; compared to captopril, ceftazidime, and ciprofloxacin - where the price variation is much wider.

Table 8. Number of times more expensive: public sector patient prices compared to international reference prices – lowest priced generics.

	Median	25%ile	75%ile	Min	Max
aciclovir	1.36	1.36	1.59	1.03	1.59
captopril	1.01	0.69	1.20	0.41	1.23
ceftazidime inj	2.32	1.35	2.47	1.29	3.85
ciprofloxacin	2.44	1.77	2.93	1.48	6.35

Across the 14 medicines found in the public sector in both originator and generic forms originator brands were 2.5 times the prices of the lowest priced generics.

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 33.3% and for originator brands, 13.3% (Table 9).

Table 9. Availability in the public sector.

	Originator brand	Lowest priced generic
Median availability (interquartile range)	13.3% (0 - 40%)	33.3% (0 - 66.7%)

Table 10 presents the availability (originator brand or generic) for each medicine in the public sector; some common medicines were not widely available.

Table 10. Availability in the public sector.

Availability	Medicine ⁶
0%	atenolol, glibenclamide, nevirapine
1 – 24%	albendazole, amitriptyline, anastrozole, azathioprine, captopril, ketoconazole, lovastatin, rifampicin
25 – 49%	alendronate, ceftazidime inj, cefuroxime, cimetidine, ciprofloxacin, diclofenac, fluconazole
50 – 69%	beclometasone inhaler, carbamazepine, cefradine inj, clarithromycin, loratadine, nifedipine, ranitidine, salbutamol inhaler
70 – 90%	aciclovir, ceftriaxone inj., fluoxetine, hydrochlorothiazide, lisinopril, losartan, metformin, phenytoin, simvastatin
91 – 100%	amlodipine, amoxicillin, digoxin, gliclazide, omeprazole, sodium chloride IV solution

Private sector patient prices

In the private sector, patient prices of originator brands were 8.8 times the international reference prices, with 50% in the wide range of approximately 2.7 - 19.5 times: which ranged from 1.3 times for simvastatin to 68 times for fluoxetine. Prices for lowest price generic equivalents were 1.8 times the international reference price, with 50% of the medicines in the range of approximately 1.3 – 4.4 times: which ranged from 0.6 (40% less) for captopril to almost 29 times for simvastatin (Table 9).

Table 11. 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)	8.76 (2.7 - 19.5)	1.77 (1.3 - 4.4)
Minimum	1.28	0.62
Maximum	68.42	28.94
No. of medicines	17	20

Figure 2 and table 12 presents 10 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 and generic fluoxetine were 68 and almost 29 times the international reference price respectively – and originator brand omeprazole was 4.5 times (350% more) the price of the generic equivalent.

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

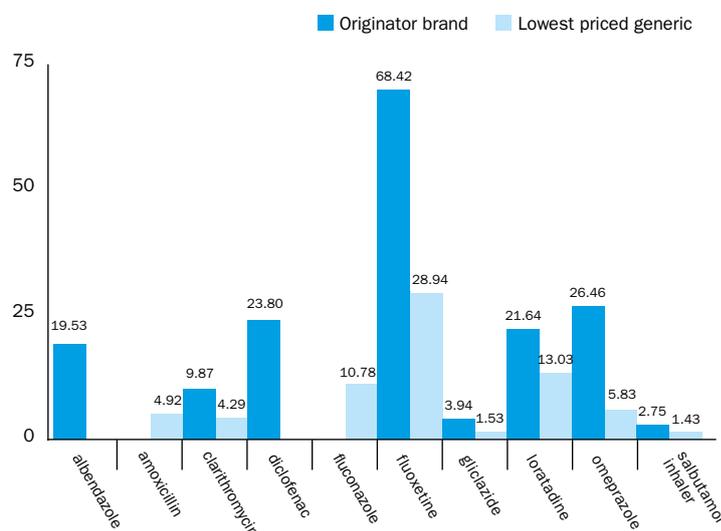


Table 12. Number of times more expensive: private sector patient prices compared to international reference prices.

	OB	LPG	Ratio OB: LPG
albendazole	19.53		
amoxicillin		4.92	
clarithromycin	9.87	4.29	2.3
diclofenac	23.80		
fluconazole		10.78	
fluoxetine	68.42	28.94	2.4
gliclazide	3.94	1.53	2.6
loratadine	21.64	13.03	1.7
omeprazole	26.46	5.83	4.5
salbutamol inhaler	2.75	1.43	1.9

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When the prices of matched pairs were analysed (only medicines where both product types were found), originator brands were 2.3 times the price of lowest priced generics for the 7 common medicines.

For many medicines, prices did not vary widely between outlets, however for some medicines the variation was much wider. Table 13 demonstrates that digoxin has a much narrower price variation, demonstrated by a small difference between the 25th and 75th percentiles, compared to ciprofloxacin, clarithromycin, and salbutamol inhaler where the price variation is much wider.

Table 13. Number of times more expensive: private sector patient prices compared to international reference prices – lowest priced generic.

	Median	25%ile	75%ile	Min	Max
ciprofloxacin	2.77	1.83	6.28	0.64	6.28
clarithromycin	4.29	2.61	4.55	1.18	4.99
digoxin	1.38	1.38	1.38	1.22	1.59
salbutamol inhaler	1.43	0.86	1.59	0.62	1.73

Private sector availability

As shown in Table 14, the median availability of originator brands was 10%; and generics were also not widely available at only 15%.

Table 14. Availability in private pharmacies.

	Originator Brand	Lowest priced generic
Median availability (interquartile range)	10% (0 – 60%)	15% (5 – 55%)

Table 15 presents the availability of the surveyed medicines in the private sector (originator brand or generic); generic versions of beclometasone inhaler were not found in any of the private pharmacies (as with the public sector).

Table 15. Availability in private pharmacies.

Availability in private pharmacies	Medicine
0%	glibenclamide, nevirapine
1 – 24%	alendronate, amitriptyline, anastrozole, atenolol, azathioprine, cefradine inj, ceftazidime inj, ceftriaxone inj, cefuroxime, lovastatin, sodium chloride IV solution
25 - 49%	ciprofloxacin
50 – 69%	beclometasone inhaler, captopril, carbamazepine, clarithromycin, fluconazole, fluoxetine, ketoconazole, lisinopril, losartan, phenytoin, rifampicin, salbutamol inhaler, simvastatin
70 - 90%	aciclovir, albendazole, amoxicillin, cimetidine, digoxin, hydrochlorothiazide, metformin, nifedipine
91 - 100%	amlodipine, diclofenac, gliclazide, loratadine, omeprazole, ranitidine

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Inter-sectoral comparison

Overall patient prices in the private sector were very similar to the prices charged in the public sector. For the 16 originator brands found in both sectors, private sector prices were the same as the public sector prices (0% difference). For the 19 lowest priced generics the difference was 3.9%.

For the 14 originator brand medicines where there were prices for public sector procurement and patient prices; patient prices were 31% more than the public sector procurement prices; and for the 25 generics, patients paid 34% more than the procurement price.

Price components

Price component data was not collected by tracking prices in the supply chain. However, some data was collected from the Center of Medicine Price Assessment, State Development and Reform Committee. Numerous charges are applied to imported medicines, including a duty tax which is generally 4%. A VAT of 17% is charged for both locally manufactured and imported medicines sold in pharmacies but not in hospitals. No dispensing fee is applied in the public or private sector.

Recommendations of the investigators

- There is a need for a medicine pricing policy, which should be incorporated into the national medicine policy.
- Remuneration mechanisms to hospitals and physicians should be reformed with the aim of improving access to medicines.
- Emphasis should be placed on encouraging generic medicines through improving the awareness of prescribers, dispensers and consumers.
- In order to avoid a conflict of interest for doctors, prescribing and dispensing should be separated.
- Establish a fair, competitive platform between private pharmacies and public hospitals so that consumers can get medicines either in pharmacies or in hospitals.
- Regulate prices of originator products - the manufacturer's selling price and mark-ups in distribution chain.
- Production costs and actual retail prices of medicines should be investigated by the Department of Medicine Pricing, National Development and Reform of Commission - and then move to finalize the price reduction plan.

Further information

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