

Medicine Prices, Availability and Affordability in Shaanxi Province, Western China

Report of a survey conducted from March 26, 2012 to May 4, 2012

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Abbreviations

Cap	capsule
EML	Essential Medicines List
GDP	Gross Domestic Product
HAI	Health Action International
Inh	Inhaler
Inj	Injection
INN	International Nonproprietary Name
LPG	Lowest priced generic equivalent
MPR	Median price ratio
MSH	Management Sciences for Health
OB	Originator brand
Susp	Suspension
Tab	Tablet
USD	United States dollars (also \$)
WHO	World Health Organization

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Conflict of Interest Statement

None of the authors of this survey or anyone who had influence on the conduct, analysis or interpretation of the results has any competing financial or other interests.

Executive summary

Background: A field study to measure the price, availability, and affordability of selected medicines was undertaken in Shaanxi Province, China, from March 26 to May 4, 2012, using a standardized methodology developed by the World Health Organization and Health Action International.

Methods:

The survey of medicine prices and availability was conducted in ten regions: Xi'an, Yulin, Baoji, Yan'an, Weinan, Xianyang, Shangluo, Ankang, Hanzhong, Tongchuan. Data on 49 medicines (35 of which were on the Essential Medicine List) was collected in 120 public and 120 private sector medicine outlets, selected using a validated sampling frame. Data was also collected on government procurement prices. For each medicine in the survey, data was collected for the originator brand and lowest priced generic equivalent (generic product with the lowest price at each facility). Medicine prices are expressed as ratios relative to Management Sciences for Health international reference prices for 2010 (median price ratio or MPR). Using the salary of the lowest-paid unskilled government worker, affordability was calculated as the number of days' wages this worker would need to purchase standard treatments for common conditions.

Key results:

Availability of medicines in the public and private sector:

- Mean availability of originator brand and generic medicines in the public sector was 7.1% and 20.0%, respectively, indicating that many patients must purchase medicines in the private sector. In the private sector, the mean availability of originator brand and generic medicines was 12.6% and 29.2%, respectively.

Public sector procurement prices:

- In the public sector, the procurement agency is purchasing medicines at prices higher than international reference prices, indicating a poor level of purchasing efficiency (originator brands and lowest priced generics were 8.89 and 1.49 times higher priced than reference prices respectively)

Public sector patient prices:

- Overall final patient prices for lowest priced generic medicines in the public sector were 1.69 times their international reference prices and originator brands were 11.83 times higher.
- Public sector patient prices for generic medicines were 13.4% more than those for public procurement and originator brands were 33% more, indicating higher mark-ups in the public sector distribution chain.

Private sector patient prices:

- Overall final patient prices for originator brands and lowest priced generics in the private sector are about 10.72 and 1.86 times their international reference prices, respectively.

- When originator brand medicines are prescribed in the private sector, patients pay about 137% more than they would for lowest priced generics.
- Generic medicines were priced 24.2% higher in the private sector than in the public sector, and originator brands were about 13% lower priced in the private sector.

Affordability of standard treatment regimens:

- In treating common conditions using standard regimens, the lowest paid unskilled government worker would need between 0.1 (hypertension) and 4.7(hypertension) days' wages to purchase lowest priced generic medicines from the private sector. If originator brands are prescribed, costs escalate to between 0.7 and 11.5 days' wages, respectively. Some treatments were clearly unaffordable, e.g. the treatment of an ulcer with originator brand omeprazole would cost 11.5 days' wages.

Conclusions:

The results of the survey show that the affordability, availability and price of medicines in China should be improved in order to ensure equity in access to basic medical treatments, especially for the poor. This requires multi-faceted interventions, as well as the review and refocusing of policies, regulations and educational interventions.

Recommendations:

Based on the results of the survey, the following recommendations can be made for improving the availability, price and affordability of medicines in China:

- An extended survey should be conducted at provincial, county and village levels and surveys should be conducted in many other provinces.
- An in-depth study of the medicine distribution process should be initiated to reveal the real picture of add-on costs.
- The national government must implement the Essential Medicines Policy to reduce the prices of medicines available, and to improve the affordability.
- The government should strengthen the pharmaceutical centralized public bidding mechanism (tenders) in order to lower medicine prices in the public sector. The pharmaceutical centralized public bidding mechanism should be more efficient.
- Hospitals should reform the remuneration mechanism. Emphasis should be placed on prescribing using the International Nonproprietary Name(INN). Greater acceptance and use of generic medicines and essential medicines must be encouraged.
- The impact of policy changes should be measured by establishing a monitoring system to regularly monitor the price, availability and affordability of medicines.

Introduction

In March 2012, the Department of Pharmacy Administration, Faculty of Pharmacy, School of Medicine, Xi'an Jiaotong University conducted a provincial study on the prices, availability, affordability and price components of a selection of medicines in China. The main goals of the study were to document the prices, availability and affordability of medicines and compare them across products types (originator brands and lowest priced generics), sectors, and other countries.

This study was conducted using the standardized methodology developed by the World Health Organization (WHO) and Health Action International (HAI). The WHO/HAI methodology is described in the manual *Measuring Medicine Prices, Availability, Affordability and Price Components* (WHO/HAI, 2008) and is accessible on the HAI website (<http://www.haiweb.org/medicineprices>).

The main objectives of the study were to answer the following questions:

- Is the public sector purchasing medicines efficiently in comparison with international reference prices?
- What is the availability of originator brand and generic medicines in the public and private sectors?
- What is the price of originator brand and generic medicines in the public and private sectors, and how does this compare with international reference prices?
- What is the difference in price of originator brand products and their generic equivalents?
- How affordable are medicines for the treatment of common conditions for people with low income?
- What different charges get added on to the price of medicines as they proceed from manufacturer to patient?
- How do the prices of medicines in China compare to those in other countries?

Country background

China is a large sized country, covering an area of 9,600,000 km². It is divided into 31 provinces. The total population is 1,370,536,875, more than half of which living in urban areas.

China is a middle income country with a GDP of US \$6,432 per capita. About 10.9% of the population live on less than US \$1/day, and 51.1% live on less than US \$2/day. Of the total labor force, approximately 4.1% of persons are unemployed.

Life expectancy at birth is 73.5 years, with 13.7% of the population over the age of 60 years by the end of 2011. Key contributors to morbidity and mortality are Viral hepatitis and AIDS.

Health sector

In 2011, the per capita total expenditure on health was US\$ 375.7 (average exchange rate). Approximately 5.1% of the GDP is spent on health. The percentage of out-of-pocket expenditure fell to 34.9%, while the proportion of government and social expenditure increased to 30.4% and 34.7%.

The public health sector is composed of 3 levels - tertiary hospitals, secondary hospitals, primary health-care center or township hospitals. The primary health-care centers (community hospitals) are supposed to be the point of first contact of patients. Patients are then referred from here to other levels of health care. The secondary care hospitals are equipped to cater for most of the local population's health needs and most tertiary hospitals serve as teaching hospitals, providing 24 hour secondary services as well as highly specialized services. In the past two decades, the central government has redirected many its health care resource towards larger urban hospitals and investment in high-tech equipment. Approximately 95% of the population has health coverage through universal coverage by the end of 2011.

Pharmaceutical sector

There are approximately 400,000 of licensed private retail medicine outlets in the country. However, hospitals remain the main outlets of pharmaceutical distribution in China, with pharmacies owned by more than 19,000 hospitals accounting for 74% of total drug sales in 2009.

National Medicines (Drugs) Policy

In China, a National Medicines Policy (NMP) document exists in official form. An implementation plan that sets out activities, responsibilities, budget and timeline is in place; it was last updated in 2009.

Regulatory system

In China, there is a formal medicines regulatory authority which is funded through the regular budget from the government. Legal provisions are in place requiring transparency and accountability and promoting a code of conduct in regulatory work.

Registration fees differ between originator brands and generic equivalents, and differ between imported and locally produced medicines.

In China, there are legal provisions for marketing authorization. A total of more than 10,000 medicinal products have been approved for marketing. A list of all registered products is publicly accessible.

Legal provisions are in place for the licensing of manufacturers, wholesalers or distributors , and importers or exporters of medicines.

A quality management system with an officially defined protocol for ensuring the quality of medicines, is in place in China. Medicine samples are tested for medicines registration and post-marketing surveillance. In 2006, 2394 samples were quality tested, with 51

failing to meet quality standards. Regulatory procedures are in place for ensuring the quality of imported medicines.

Legal provisions are in place for the licensing and practice of prescribers and pharmacy.

Prescribing by generic name is obligatory in the public and private sector.

Generic substitution is permitted in public and private pharmacies.

There are incentives to dispense generic medicines at public or private pharmacies.

There are provisions in the medicines legislation/regulations covering promotion and/or advertising of medicines.

Medicines supply system

Public sector procurement is pooled at the national level (i.e. there is centralized procurement for the regions/provinces).

Public sector medicines procurement is the responsibility of the Ministry of Health(MoH). Public sector medicines distribution is the responsibility of the Ministry of Health.

The following tender processes are used for public sector procurement:

National competitive tender - 100% of total cost

International competitive tender - 0% of total cost

Negotiation / direct purchasing - 0% of total cost

Public sector procurement is not limited to medicines on the Essential Medicines List (EML). There are no regulations for local preference in public sector procurement.

Medicines financing

In 2011, the total public expenditure for medicines was US\$ 35 billion.

There is a national policy to provide some medicines free of charge (i.e. patients do not pay out-of-pocket for medicines) at public primary care facilities. The following patients receive medicines for free: tuberculosis and AIDS patients who cannot afford them.

The following fees are commonly charged at primary care facilities: consultation fees, flat fees for medicines.

Revenues from fees or the sale of medicines are always used to pay the salaries or supplement the income of public health personnel in the same facility.

Prescribers in the public sector never dispense medicines, while prescribers in the private sector frequently dispense medicines.

In China, most of the population has public health insurance, which covers some medicines. Some of the population has private health insurance, which covers some medicines.

China has a policy covering medicine prices that applies to the public sector, the private sector, and non-governmental organizations. It includes policies of maximum retail mark-ups, duty on imported raw materials, duty on imported finished pharmaceutical products.

The government sets the price of some originator brand products through direct price controls.

The government sets the price of some generic products through direct price controls.

The national Essential Medicines List is not being used for setting prices of medicines in the private sector. Setting prices is part of market authorization.

China has a national medicine price monitoring system for retail/patient prices. There are regulations mandating retail/patient medicine price information to be made publicly accessible. There are official written guidelines on medicine donations that provide rules and regulations for donors and provide guidance to the public, private and/or NGO sectors on accepting and handling donated medicines.

Rational use of medicines

China's Essential Medicines List (EML), last updated in 2009, contains 307 unique medicine formulations. The national EML is being used for public sector procurement and public insurance reimbursement. There is a committee responsible for the selection of products on the national EML.

As for the safety supervision, in December 2009, the MOH formulated guidelines and prescription formularies of essential medicines for clinical use so as to strengthen guidance and supervision over medication. By the end of late March 2011, all varieties of essential medicines have been subject to electronic supervision, the whole process of manufacturing, distribution, and use of drugs by manufacturers, distributors, pharmacies and medical institutions can be traced via the full-scale electronic supervision system. Antibiotics are occasionally sold over the counter without a prescription, while injections are occasionally sold over the counter without a prescription.

Methodology

Overview

The survey of the prices, availability and affordability of medicines in China was conducted using the standardized WHO/HAI methodology (WHO/HAI 2008). Data on the availability and final (patient) prices of medicines were collected in medicine outlets in the public and private sectors. Government procurement prices were also surveyed.

A total of 49 medicines were surveyed – 27 from the WHO/HAI core list (12 global medicines and 15 regional medicines), and 22 supplementary medicines selected at the country level. Of the 49 medicines, 35 were on the national Essential Medicines List.

For each medicine in the survey, up to two products were monitored, namely:

- Originator brand (OB) - the original patented pharmaceutical product (identified centrally)
- Lowest-priced generic equivalent (LPG) - the lowest-priced in the facility at the time of the survey

All prices were converted to US dollars using the exchange rate (buying rate) on March 26, 2012, the first day of data collection, i.e. 1 USD = 6.2915 Yuan.

Selection of medicine outlets

Sampling was conducted in a manner consistent with the WHO/HAI methodology, which has been shown through a recent validation study to yield a nationally representative sample¹.

In the first step, 10 regions were selected as "survey areas" for data collection. The major urban centre of Xi'an was selected as one survey area, and an additional nine areas were chosen at random from those which could be reached within a one day's drive from those which could be reached within a one day's drive from Xi'an. This resulted in the following ten survey areas:

1. Xi'an (major urban centre)
2. Yulin
3. Yan'an
4. Baoji
5. Shangluo
6. Weinan
7. Xianyang
8. Hanzhong
9. Tongchuan
10. Ankang

¹ The WHO/HAI sampling methodology was validated in 2005 when a medicine prices survey conducted in Peru. In this survey, a much larger selection of public and private medicine outlets, from a greater number of geographical regions, were included than is required in the standard sample. Results from the expanded sample were consistent with those from the standard sample, showing that the standard sampling frame is nationally representative.

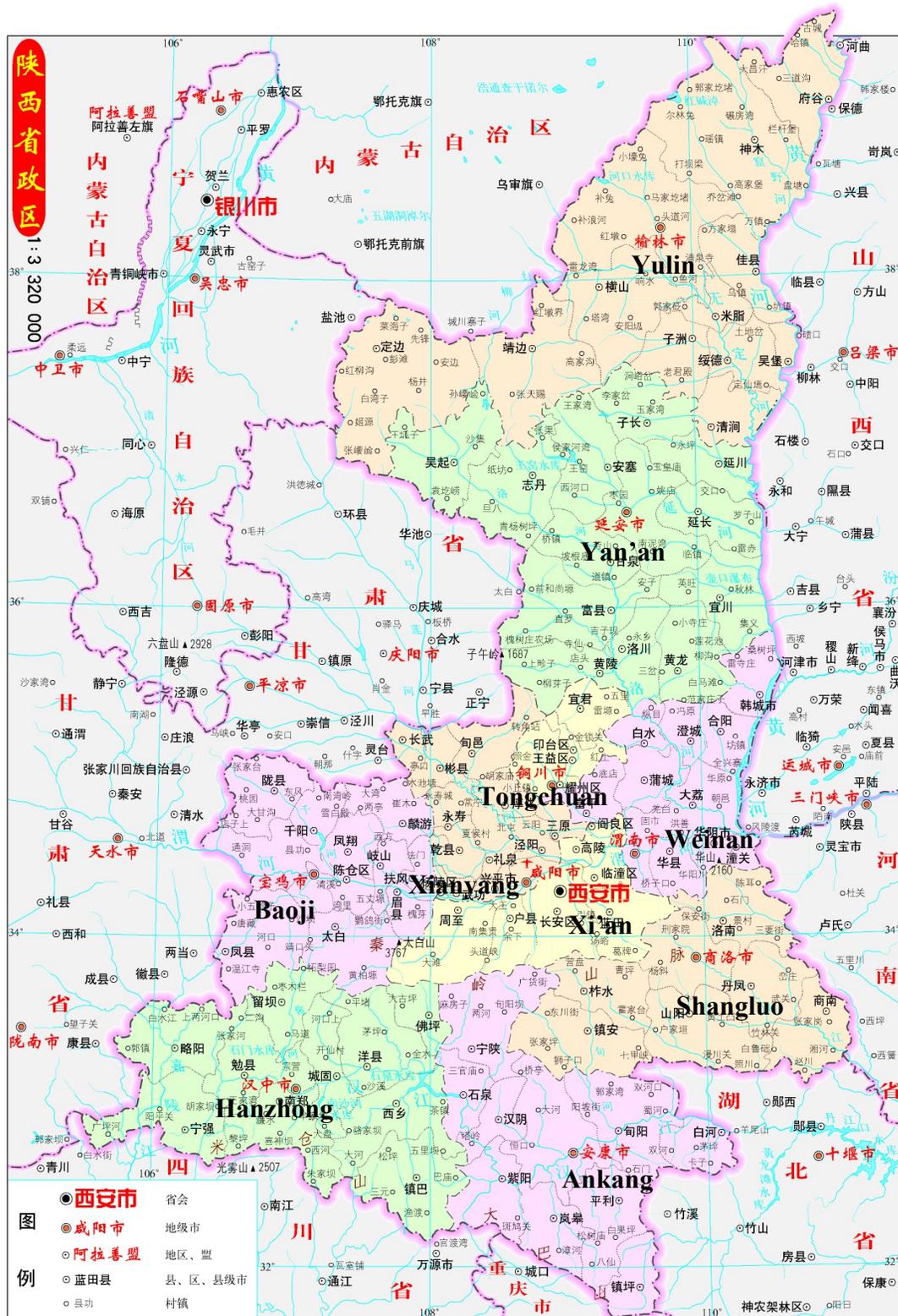


Figure1. Geographic location of the ten survey areas sampled in the survey

In each survey area, the sample of public sector medicine outlets was identified by first selecting the main public hospital. An additional five public medicine outlets (e.g. hospital out-patient medicine outlets, dispensaries) per survey area were then selected at random from those within a 4 hour's drive from the main hospital. In China, this selection was made from all public facilities expected to stock most of the medicines in the survey, namely tertiary hospitals, secondary hospitals, primary health care centres and township hospital. Since rural health posts are not expected to stock the majority of medicines in the survey, these were excluded from the sampling frame. The public sector sample therefore contained six public medicine outlets in each of the ten survey areas, for a total of 60 public outlets. The private sector sample was identified by selecting the private sector medicine outlet closest to each of the selected public medicine outlets, yielding a total of 60 private outlets.

Table 1. Sample of public and private medicine outlets

Areas	Xi'an	Yulin	Yan'an	Baoji	Shangluo	Weinan	Ankang	Hanzhong	Xianyang	Tongchuan
Public sector	-1 tertiary hospital -2 secondary hospitals -3 primary care centres	-1 tertiary hospital -2 secondary hospitals -3 primary care centres	-1 tertiary hospital -2 secondary hospitals -3 primary care centres	-1 tertiary hospital -2 secondary hospitals -3 primary care centres						
Private sector	-6 pharmacies nearest to the selected public hospital	-6 pharmacies nearest to the selected public hospital	-6 pharmacies nearest to the selected public hospital	-6 pharmacies nearest to the selected public hospital						

Selection of medicines to be surveyed

The WHO/HAI methodology specifies a core list of 14 global medicines and 16 regional medicines to be surveyed, representing medicines commonly used in the treatment of a range of chronic and acute conditions. The methodology also includes the specific dosage form and strength that is to be collected for each medicine. This ensures that data on comparable products are collected in all surveys, thereby allowing international comparisons to be made.

In China, 12 of the 14 global core medicines, and 15 of the 16 regional medicines, from the WHO/HAI core list were included in the survey. The following 3 medicines were excluded:

- Co-trimoxazole, suspension, 8+40mg/ml
- Paracetamol, suspension, 24g/ml
- Amoxicillin suspension, 25 mg/ml (125mg/5ml)

These medicines were excluded from the survey as they were not available in China.

An additional 22 supplementary medicines were selected at the country level for inclusion in the survey. Supplementary medicines were selected based on local importance, EML and disease burden. The full list of survey medicines is provided in Annex 1.

Data Collection

The survey team consisted of a survey manager, 7 area supervisors, 10 data collectors and 2 data entry personnel. All survey personnel received training in the standard survey methodology and data collection/data entry procedures at a workshop held on March 4, 2012 to March 11, 2012. As part of the workshop, a data collection pilot test was conducted at public and private medicine outlets which did not form part of the survey sample.

Data collection took place between March 26, 2012 and May 4, 2012. Data collectors visited medicine outlets in pairs and collected information on medicine availability and price using a standard data collection form specific to the medicines being surveyed in China. Area supervisors checked all forms at the end of each day of data collection, and validated the data collection process by collecting data at 20% of the medicine outlets and comparing their results with those of the data collectors. Upon completion of the survey the survey manager conducted a quality control check of all data collection forms prior to data entry.

When data collectors did not find at least 50% of the targeted medicines in any given medicine outlet, data was entered into the workbook an additional outlet was surveyed. This increased the total sample to 120 public sector medicine outlets and 120 private sector medicine outlets.

Public procurement data was collected on the prices that the government pays to procure medicines. Data was collected for the same global, regional and supplementary medicines as surveyed in medicine outlets. Procurement data was obtained from 1 of recent procurement order(s) from the centralized medicine procurement agency and the public facilities.

Data Entry

Survey data was entered into the pre-programmed MS Excel *Workbook* provided as part of the WHO/HAI methodology. Data entry was checked using the 'double entry' and 'data checker' functions of the *Workbook*. Erroneous entries and potential outliers were verified and corrected as necessary. HAI also reviewed the data.

Data Analysis

The availability of individual medicines is calculated as the percentage (%) of medicine outlets where the medicine was found. Mean (average) availability is also reported for the overall 'basket' of medicines surveyed. The availability data only refers to the day of data collection at each particular facility and may not reflect average monthly or yearly availability of medicines at individual facilities. The availability of individual medicines in the public sector was limited to those facilities where the medicine was expected to be

available. For example, if a survey medicine is only provided through secondary or tertiary hospitals, the calculation of the medicine's % availability was limited to these facilities.

To facilitate cross-country comparisons, medicine prices obtained during the survey are expressed as ratios relative to a standard set of international reference prices:

$$\text{Medicine Price Ratio (MPR)} = \frac{\text{median local unit price}}{\text{international reference unit price}}$$

The ratio is thus an expression of how much greater or less the local medicine price is than the international reference price e.g. an MPR of 2 would mean that the local medicine price is twice that of the international reference price. Median price ratios were only calculated for medicines with price data from at least 4 medicine outlets, except for procurement prices where a single data point was accepted. The exchange rate used to calculate MPRs was 1 US\$ =6.2915 Yuan; this was the commercial "buy" rate on the first day of data collection taken from Oanda FX-History.

The reference prices used were the 2010 Management Sciences for Health (MSH) reference prices, taken from the International Drug Price Indicator Guide. These reference prices are the medians of recent procurement prices offered by for-profit and not-for-profit suppliers to international not-for-profit agencies for generic products. These agencies typically sell in bulk quantity to governments or large NGOs, and are therefore relatively low and represent efficient bulk procurement without the costs of shipping or insurance.

Price results are presented for individual medicines, as well as for the overall 'basket' of medicines surveyed. Summary results for the basket of medicines have been shown to provide a reasonable representation of medicines in the country and price conditions on the market. As averages can be skewed by outlying values, median values have been used in the price analysis as a better representation of the midpoint value. The magnitude of price and availability variations is presented as the interquartile range. A quartile is a percentile rank that divides a distribution into 4 equal parts. The range of values containing the central half of the observations, that is, the range between the 25th and 75th percentiles, is the interquartile range.

Finally, the affordability of treating 22 common conditions was assessed by comparing the total cost of medicines prescribed at a standard dose, to the daily wage of the lowest paid unskilled government worker (33.3333 Yuan/day and about 5.30 USD/day at the time of the survey). Though it is difficult to assess true affordability, treatments costing one days' wage or less (for a full course of treatment for an acute condition, or a 30-day supply of medicine for chronic diseases) are generally considered affordable.

Results

1. Availability of medicines on the day of data collection

Table 2. Mean availability of medicines on the day of data collection, public and private sectors

	Public sector (n = 120 outlets)				Private sector (n = 120 outlets)	
	All medicines (n = 49 medicines)		EML medicines only (n = 35 medicines)		All medicines (n = 49 medicines)	
	Originator brand	Lowest price generic	Originator brand	Lowest price generic	Originator brand	Lowest price generic
Mean availability (standard deviation)	7.1% (11.7%)	20.0% (23.4%)	6.1% (12.0%)	24.8% (25.7%)	12.6% (19.6%)	29.2% (26.5%)

- For originator brands, average availability of all survey medicines in the public sector was low at 7.1%. When analysis is limited to survey medicines listed on the national EML, public sector availability decreased to 6.1%.
- In the public sector, generics were the predominant product type available. However, the average availability of generics was low at 20.0% for all medicines and 24.7% for medicines on the EML
- Average availability in the private sector was low at 12.6% for originator brands. Generics were the predominant product type available but availability was still suboptimal at 29.2%.
- In the private sector, medicine availability was higher than that of the public sector.

Annex 3 contains the availability of individual medicines in both public and private sectors. In the public sector, generics with particularly low availability include Acyclovir(4.2%), Atenolol(0%), Beclometasone inhaler(0%), Cefradine(1.7%), Cimetidine(0%), Ciprofloxacin(0.8%), Diazepam(0.8%), Diclofenac(3.3%), Erythromycin(0%), Fluconazole(5.0%), Fluoxetine(2.5%), Glibenclamide(1.7%), Ibuprofen(0.8%), Lisinopril(1.7%), Metformin(3.3%), Ofloxacin(0%), Paracetamol(3.3%), Salbutamol inhaler(4.2%). In the private sector, generics with particularly low availability include Abendazole(4.2%), Atenolol(0%), Beclometasone inhaler(0%), Cefradine(6.7%), Cimetidine(2.5%), Diazepam(0%), Fluoxetine(1.7%), Glibenclamide(1.7%), Ibuprofen(3.3%), Ketoconazole(0.8%), Lisinopril(5.8%), Ofloxacin(2.5%), Paracetamol(5.8%), Phenytoin(3.3%).

Table 3. Availability of medicines in the public sector

Availability	Originator brand	Lowest price generic
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Medicines not found in any outlets	Aciclovir, Amitriptyline, Amoxicillin, Atenolol, Captopril, Cefradine, Cephalexin, Cimetidine, Ciprofloxacin, Diazepam, Enalapril, Erythromycin, Fluconazole, Glibenclamide, Hydrochlorothiazide, Lisinopril, Lovastatin, Ofloxacin, Phenytoin, Ranitidine, Sodium Valproate	Atenolol, Beclometasone inhaler, Cimetidine, Erythromycin, Ketoconazole, Ofloxacin
Medicines found in less than 25% of outlets	Albendazole, Azithromycin, Beclometasone inhaler, Carbamazepine, Ceftazidime injection, Ceftriaxone injection, Co-trimoxazole, Diclofenac, Digoxin, Fluoxetine, Gliclazide, Isosorbide mononitrate, Ketoconazole, Ibuprofen, Loratadine, Losartan, Metformin, Metronidazole, Nifedipine Retard, Omeprazole, Paracetamol, Rifampicin, Simvastatin	Aciclovir, Albendazole, Amitriptyline, Amlodipine, Atorvastatin, Carbamazepine, Cefradine, Cephalexin, Ciprofloxacin, Diazepam, Diclofenac, Fluconazole, Fluoxetine, Glibenclamide, Gliclazide, Ibuprofen, Lisinopril, Loratadine, Losartan, Lovastatin, Metformin, Miconazole Nitrate, Nifedipine Retard, Paracetamol, Phenytoin, Rifampicin, Salbutamol inhaler, Simvastatin, Sodium Valproate
Medicines found in 25 to 50% of outlets	Amlodipine, Atorvastatin, Salbutamol inhaler	Amoxicillin, Azithromycin, Co-trimoxazole, Isosorbide mononitrate, Ranitidine, Ceftazidime injection
Medicines found in 50 to 75% of outlets	Miconazole Nitrate	Aminophylline, Captopril, Ceftriaxone injection, Digoxin, Enalapril, Hydrochlorothiazide, Omeprazole
Medicines found in over 75% of outlets		Metronidazole

Table 4. Availability of medicines in the private sector

	Originator brand	Lowest price generic
Medicines not found in any outlets	Amoxicillin, Captopril, Cefradine, Cephalexin, Ciprofloxacin, Diazepam, Digoxin, Enalapril, Erythromycin, Fluconazole, Glibenclamide, Hydrochlorothiazide, Lisinopril, Lovastatin, Metronidazole, Ofloxacin, Phenytoin, Ranitidine, Rifampicin	Atenolol, Beclometasone inhaler, Diazepam,
Medicines found in less than 25% of	Aciclovir, Amitriptyline, Atenolol, Azithromycin, Beclometasone inhaler, Carbamazepine, Salbutamol inhaler, Ceftazidime injection, Ceftriaxone injection, Cimetidine, Co-trimoxazole,	Aciclovir, Albendazole, Amitriptyline, Atorvastatin, Carbamazepine, Cefradine, Ceftazidime injection, Cimetidine, Ciprofloxacin, Diclofenac, Erythromycin, Fluconazole,

outlets	Diclofenac, Fluoxetine, Isosorbide mononitrate, Ibuprofen, Losartan, Nifedipine Retard, Paracetamol, Sodium Valproate	Fluoxetine, Glibenclamide, Ibuprofen, Ketoconazole, Lisinopril, Losartan, Metformin, Miconazole Nitrate, Ofloxacin, Paracetamol, Phenytoin, Salbutamol inhaler
Medicines found in 25 to 50% of outlets	Gliclazide, Ketoconazole, Loratadine, Metformin, Omeprazole, Simvastatin	Amlodipine, Ceftriaxone injection, Cephalexin, Gliclazide, Isosorbide mononitrate, Lovastatin, Nifedipine Retard, Sodium Valproate, Rifampicin
Medicines found in 50 to 75% of outlets	Albendazole, Amlodipine, Atorvastatin,	Amoxicillin, Aminophylline, Co-trimoxazole, Digoxin, Enalapril, Hydrochlorothiazide, Loratadine, Metronidazole, Ranitidine, Simvastatin
Medicines found in over 75% of outlets	Miconazole Nitrate	Azithromycin, Captopril, Omeprazole,

2. Public sector prices

2.1 Public sector procurement prices

Table 5. Public sector procurement prices- ratio of median unit price to MSH international reference price (median price ratio or MPR), median for all medicines found

Product type	Median MPR	25 th percentile	75 th percentile
Originator brand (n = 19 medicines)	8.89	5.88	23.74
Lowest price generic (n = 35 medicines)	1.49	0.48	4.61

In table 5, of the 49 medicines included in the survey, public sector procurement prices were available for 19 originator brand and 35 generics; the public sector is therefore procuring predominantly generic products. Based on the median MPRs, the public sector is procuring generics at 1.49 times their international reference prices, and originator brands at 8.89 times their international reference prices. Thus, the government procurement agency is purchasing efficiently when buying generics but not originator brands which overall were very high priced. The interquartile range shows substantial variation in median price ratios across individual medicines. Though being procured at high prices, originator brands are considered to be superior to the generics in both quality and efficacy, leading to the fact that the government is buying high priced originator brands when lower priced generics are available.

Annex 4 contains procurement prices for individual medicines. All originator brand for which the government is paying several times the international reference price. Generic medicines being purchased at prices significantly less than international prices include Acyclovir(0.35), Aminophylline(0.25), Azithromycin(0.50), Captopril(0.33), Ceftriaxone injection(0.33), Cephalexin(0.47), Co-trimoxazole(0.94), Glixlazide(0.88), Hydrochlorothiazide(0.43), Metronidazole(0.71), Phenytoin(0.52), Ranitidine(0.60), Rifampicin(0.09), Sodium Valproate(0.27), Ceftazidime injection(0.41). Conversely, medicines for which the government is paying 5 times the international reference price include Atorvastatin(15.39), Diclofenac(20.05), Enalapril(8.28), Fluconazole(21.82), Loratadine(17.54), Losartan(28.96), Lovastatin(26.33).

2.2 Public sector patient prices

Table 6. Public sector patient prices - ratio of median unit price to MSH international reference price (median price ratio or MPR), median for all medicines found

Product type	Median MPR	25 th percentile	75 th percentile
Originator brand (n = 19 medicines)	11.83	6.76	27.61
Lowest price generic (n = 35 medicines)	1.69	0.64	5.07

As shown in Table 6, in the public sector:

- Originator brand medicines were generally sold at 11.83 times their international reference price. Half of the originator brand medicines were priced at 6.76 to 27.61 times their international reference price; there was therefore substantial variation in MPRs across individual originator brand medicines in the public sector.
- Lowest price generic medicines were generally sold at 1.69 times their international reference price. Half of the lowest priced generic medicines were priced at 0.64 to 5.07 times their international reference price; there was therefore moderate variation in MPRs across individual generic medicines in the public sector.

Annex 5 contains the median price ratios for individual medicines found in the public sector. Originator brand medicines priced more than 20 times higher than international reference prices include: Amlodipine(28.18), Atorvastatin(27.04), Loratadine(25.31), Losartan(42.19), Metformin(22.10), Nifedipine Retard(36.53), Omeprazole(75.69). The 25th and 75th percentiles for individual medicines show that, for originator brands, prices vary significantly between public sector medicine outlets. Lowest price generic medicines priced more than 5 times higher than international reference prices include Amlodipine(6.72), Atorvastatin(19.16), Diclofenac(25.83), Loratadine(15.01), Losartan(34.86), Lovastatin(33.80), Simvastatin(5.32). The 25th and 75th percentiles for individual

medicines show that, for generic medicines, prices vary significantly between public sector medicine outlets.

In table 7, only those medicines for which both the originator brand and a generically equivalent product were found were included in the analysis to allow for the comparison of prices between the two product types. Results showed that in the public sector, originator brands cost 641.67% more than their generic equivalents.

Table 7. Comparison of the prices of originator brands and generically equivalent products

Type (n = 15 medicines)	Median MPR	25 %ile	75 %ile
Originator brand	15.13	7.60	27.61
Lowest price generic	2.04	0.96	6.02

2.3 Comparison of patient prices and procurement prices in the public sector

Table 8. Median MPRs for medicines found in both public procurement and public sector medicine outlets (final patient prices)

Product type	Median MPR Public Procurement	Median MPR Public Patient Prices	% difference patient prices to procurement
Originator brand (n = 19 medicines)	8.89	11.83	33.0%
Lowest price generic (n = 35 medicines)	1.49	1.69	13.4%

In table 8, only those medicines found in both public procurement and public sector medicine outlets were included in the analysis to allow for the comparison of purchase price to final patient price. Results showed that final patient prices in the public sector were 33.0% and 13.4% higher than procurement prices for originator brands and generic equivalents, respectively.

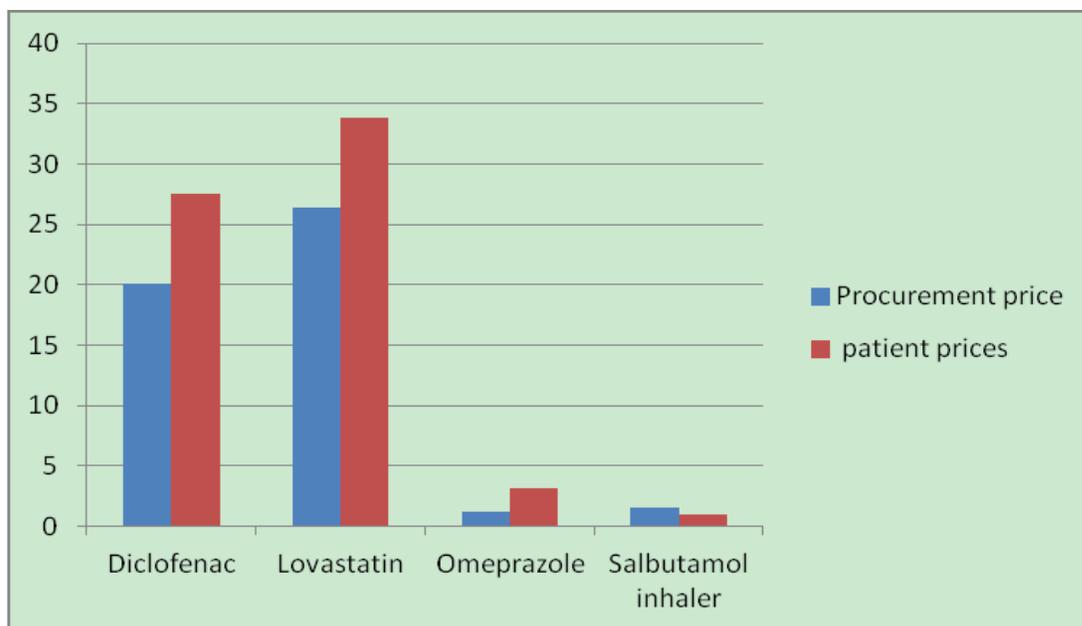


Figure 2. Procurement prices and patient prices in the public sector: median price ratios for lowest priced generic medicines

3. Private sector patient prices

Table 9. Ratio of median unit price to MSH international reference price (median price ratio or MPR), median for all medicines found

Product type	Median MPR	25 %ile	75 %ile
Originator brand (n = 20 medicines)	10.72	6.55	23.16
Lowest price generic (n = 41 medicines)	1.86	0.56	5.89

Table 9 shows that in the private sector:

- Originator brand medicines are generally sold at 10.72 times their international reference price. Half of the originator brand medicines were priced at 6.55 to 23.16 times their international reference price; there is therefore substantial variation in MPRs across individual originator brand medicines in the public sector.
- Lowest price generic medicines are generally sold at 1.86 times their international reference price. Half of the lowest priced generic medicines were priced at 0.56 to 5.89 times their international reference price; there is therefore substantial variation in MPRs across individual generic medicines in the public sector.

Annex 6 contains the median price ratios for individual medicines found in the private

sector. Originator brand medicines priced more than 20 times higher than international reference prices include Amlodipine(25.52), Atorvastatin(21.86), Diclofenac(36.96), Fluoxetine(33.87),Loratadine(22.37),Losartan(37.55),Metformin(20.44),Omeprazole(67.90). The 25th and 75th percentiles for individual medicines show that, for originator brands, prices vary significantly between private sector medicine outlets. Lowest price generic medicines priced more than 5 times higher than international reference prices include Amlodipine(6.66), Diclofenac(29.57), Enalapril(10.60), Fluconazole(20.44), Ibuprofen(13.51),Loratadine(15.31),Losartan(32.45), Lovastatin(33.79), Metformin(8.53), Miconazole Nitrate(5.22), Paracetamol(5.89), Simvastatin(5.08). The 25th and 75th percentiles for individual medicines show that, for generic medicines, prices vary significantly between private sector medicine outlets.

Table 10. Comparison of the prices of originator brands and generically equivalent products: Median MPRs for medicines found as both product types

Type (n = 16 medicines)	Median MPR	25 %ile	75 %ile
Originator brand	10.72	7.50	23.16
Lowest price generic	4.53	1.94	7.12

In table 10, only those medicines for which both the originator brand and a generically equivalent product were found, were included in the analysis to allow for the comparison of prices between the two product types. Results showed that in the private sector, originator brands cost 136.13% more, on average, than their generic equivalents.

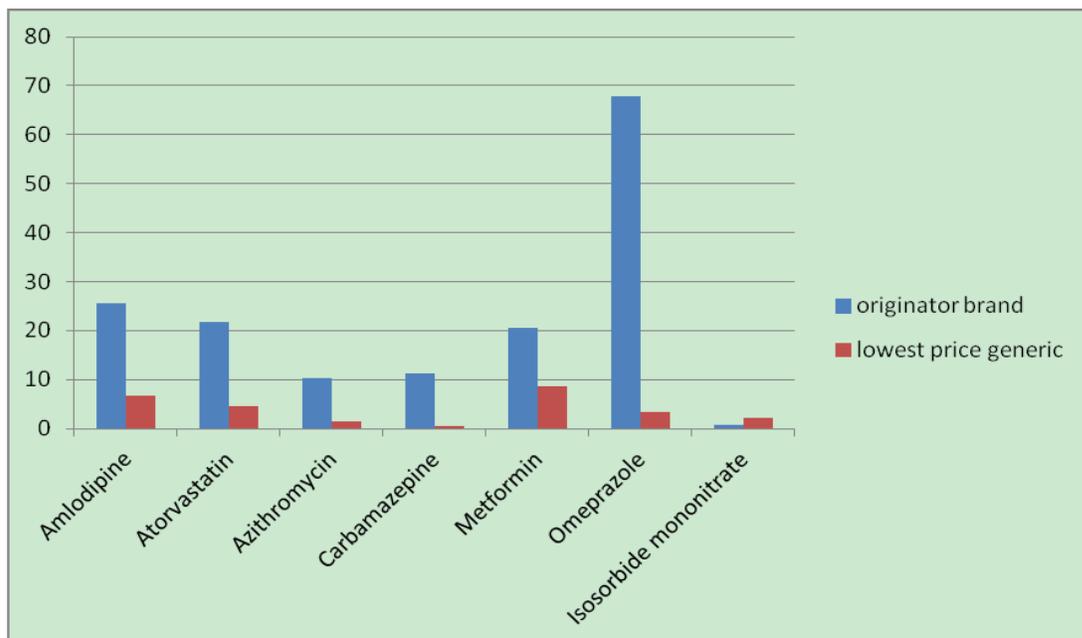


Figure 3. Median price ratios for selected medicines, originator brand and generic equivalents, private sector

4. Comparison of patient prices in the public and private sectors

Table 11. Median MPRs for medicines found in both public and private sectors

Product type	Median MPR Public sector patient prices	Median MPR Private sector patient prices	% difference private to public
Originator brand (n = 17 medicines)	11.83	10.25	-13.4%
Lowest price generic (n = 35 medicines)	1.69	2.1	24.2%

In table 11, only those medicines found in both public and private sector medicine outlets were included in the analysis to allow for the comparison of prices between the two sectors. Results showed that final patient prices in the private sector were -13.4% and 24.2% higher than in the public sector for originator brands and generic equivalents, respectively.

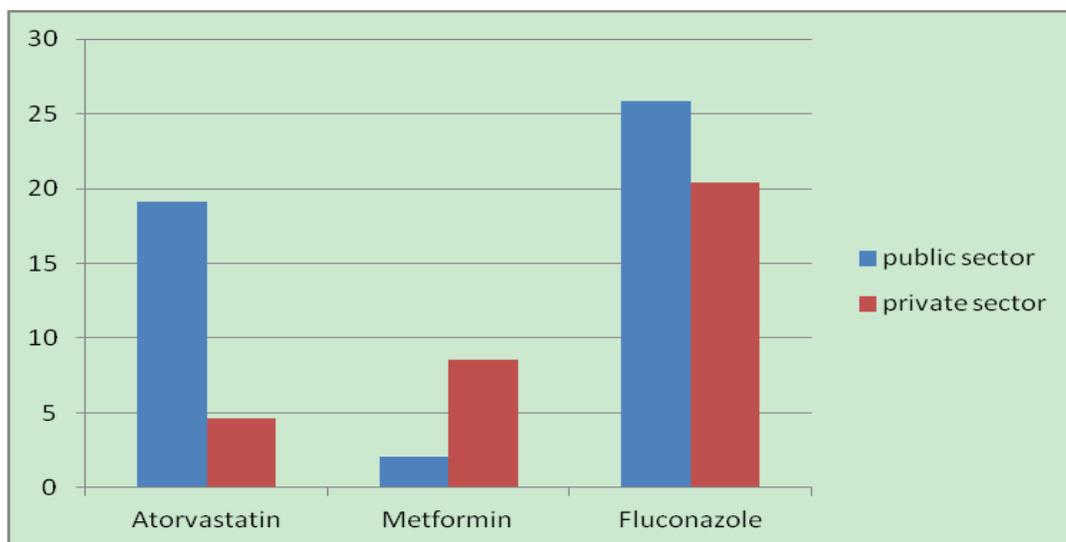


Figure 4. Median price ratios for selected lowest priced generic medicines in the public and private sectors

5. Regional analysis

5.1 Comparison of prices and availability in public sectors across the ten regions surveyed

As shown in the Table 12, the median MPR for originator brands in the public sector differed significantly across the ten regions surveyed. Overall, medicine prices were lowest in Tongchuan for originator brands and Xian for generics, and highest in Weinan for both product types.. Median MPRs for originator brands ranged from 4.43 in Tongchuan to 19.37 in Weinan. Median MPRs for lowest price generics ranged from 0.60 in Xi'an to 1.53 in Weinan.

Table 12. Median MPRs per survey area, public sector

Survey area	Xi'an	Yulin	Xian yang	Baoji	Shang lu	Wei nan	Han zhong	An kang	Yan an	Tong chuan
Median MPR Originator brand	8.70 (n=3)	8.98 (n=8)	7.57 (n=6)	8.85 (n=3)	8.86 (n=1)	19.37 (n=10)	5.52 (n=2)	15.41 (n=2)	9.10 (n=3)	4.43 (n=1)
Median MPR Lowest price generic	0.60 (n=10)	0.89 (n=17)	1.42 (n=14)	1.14 (n=15)	0.84 (n=7)	1.53 (n=16)	0.75 (n=17)	0.73 (n=13)	1.12 (n=10)	1.02 (n=8)

As shown in the table 13, the mean availability of survey medicines in the public sector ranged from 13.9% in Shangluo and 25.7% in Yulin for generic equivalents. For originator brands, mean availability was highest in Weinan (12.7%) and lowest in Shangluo (3.0%).

Table 13. Mean availability per survey area, public sector

Survey area	Mean availability (%)									
	Xi'an	Yulin	Xian yang	Baoji	Shang lu	Wei nan	Han zhong	An kang	Yan an	Tong chuan
Originator brand	7.3	9.7	10.4	6.9	3.0	12.7	6.1	4.0	6.1	4.7
Lowest price generic	14.8	25.7	19.2	22.8	13.9	25.5	23.8	20.2	17.5	16.5

5.2 Comparison of prices and availability in private sectors across the ten regions surveyed

As shown in table 14, the median MPR for generics in the private sector did not differ significantly across the ten regions surveyed. Overall, medicine prices were lowest in Weinan and highest in Baoji for generics. Median MPRs for originator brands ranged from 6.98 in Hanzhong to 20.46 in Weinan. Median MPRs for lowest price generics ranged from 0.78 in Weinan to 1.96 in Baoji.

Table 14. Median MPRs per survey area, private sector

Survey area	Xi'an	Yulin	Xian yang	Baoji	Shang lu	Wei nan	Han zhong	An kang	Yan an	Tong chuan
Median MPR Originator brand	10.33 (n=15)	20.06 (n=11)	12.49 (n=11)	19.00 (n=11)	7.55 (n=5)	20.46 (n=14)	6.98 (n=7)	7.58 (n=7)	8.49 (n=5)	17.16 (n=4)

Median MPR Lowest price generic	1.76 (n=22)	1.22 (n=22)	1.28 (n=24)	1.96 (n=23)	0.90 (n=18)	0.78 (n=26)	1.89 (n=21)	1.03 (n=12)	1.77 (n=17)	1.47 (n=10)
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As shown in the table 15, the mean availability of survey medicines in the private sector ranged from 15.5% in Tongchuan and 37.4% in Yulin for generic equivalents. For originator brands, mean availability was lowest in Shangluo (5.9%) and highest in Xi'an (19.6%).

Table 15. Mean availability per survey area, private sector

Survey area	Mean availability (%)									
	Xi'an	Yulin	Xian yang	Baoji	Shang lu	Wei nan	Han zhong	An kang	Yan an	Tong chuan
Originator brand	19.6	16.1	15.5	16.1	5.9	18.4	11.3	8.0	8.0	6.9
Lowest price generic	31.1	37.4	36.6	37.2	23.1	36.6	33.2	19.2	22.1	15.5

6. Affordability of standard treatment regimens

The affordability of treatment for 22 common conditions (Table 16) was estimated as the number of days' wages of the lowest-paid unskilled government worker needed to purchase medicines prescribed at a standard dose. For acute conditions, treatment duration was defined as a full course of therapy (usually 7 days), while for chronic diseases, the affordability of a 30-days' supply of medicines was determined. The daily wage of the lowest-paid unskilled government worker used in the analysis was 33.3333 Yuan.

Table 16. Number of days' wages of the lowest paid government worker needed to purchase standard treatments

Disease condition and 'standard' treatment			Day's wages to pay for treatment			
Condition	Drug name, strength, dosage form	Treatment schedule	public sector		private sector	
			Originator brand	Lowest price generic	Originator brand	Lowest price generic
Asthma	Salbutamol 100 mcg/dose inhaler	1 inhaler of 200 doses	0.7	0.3	0.7	0.2
	Beclometasone inhaler 50mcg/dose	1 inhaler of 200 doses	1.4		1.4	

Diabetes	Metformin 500mg cap/tab	1 cap/tab x 3 x 30 days = 90	3.9	0.4	3.6	1.5
	Gliclazide 80mg cap/tab	1 cap/tab x 30 days = 30	1.1	0.4	1.0	0.3
Hypertension	Amlodipine 5 mg cap/tab	1 cap/tab x 30 days = 30	4.9	1.2	4.4	1.2
	Captopril 25 mg cap/tab	1 cap/tab x 2 x 30 days = 60		0.1		0.1
	Lisinopril 10mg cap/tab	1 cap/tab x 2 x 30 days = 60				3.1
	Losartan 50mg cap/tab	1 cap/tab x 30 days = 30	6.1	5.0	5.4	4.7
	Nifedipine Retard 20mg cap/tab	1 cap/tab x 2 x 30 days = 60	8.8	1.2	2.2	1.1
Hypercholesterol-aemia	Simvastatin 20 mg cap/tab	1 cap/tab x 30 days = 30	3.2	1.8	3.1	1.7
	Atorvastatin 20mg cap/tab	1 cap/tab x 30 days = 30	9.5	6.7	7.7	1.6
Depression	Amitriptyline 25 mg cap/tab	1 cap/tab x 3 for 30 days = 90		0.5		0.5
	Fluoxetine 20mg cap/tab	1 cap/tab x 30 days = 30	10.1		2.3	
Adult respiratory infection	Ciprofloxacin 500 mg cap/tab	1 cap/tab x 2 for 7 days = 14				<0.1
	Co-trimoxazole 80+400mg cap/tab	1 cap/tab x 2 for 7 days = 14		<0.1		<0.1
	Amoxicillin 500mg cap/tab	1 cap/tab x 3 for 7 days = 21		0.4		0.3
	Ceftriaxone 1 g/vial injection	1 vial	2.0	0.1		0.1
Ulcer	Omeprazole 20mg cap/tab	1 cap/tab x 30 days = 30	12.9	0.5	11.5	0.6
	Ranitidine 150mg cap/tab	1 cap/tab x 2 x 30 days = 60		0.1		0.1
Arthritis	Diclofenac 50mg cap/tab	1 cap/tab x 2 x 30 days = 60		1.3	1.8	1.4
Epilepsy	Carbamazepine 100mg cap/tab	1 cap/tab x 2 x 30 days = 60	2.0		1.9	0.1
Viral infection	Aciclovir 200mg cap/tab	1 cap/tab x 5 x 5 days = 25		0.1		0.3

The affordability of lowest price generics in the public sector was good for most conditions, with standard treatment costing a days' wage or less. Treatments costing over a days' wage of the lowest paid government worker include Hypertension Amlodipine 5

mg cap/tab 1 cap/tab x 30 days (1.2 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.2 days' wages), Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (2.2 days' wages), Hypercholesterolaemia Atorvastatin 20 mg cap/tab 1 cap/tab x 30 days (6.7 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (1.3 days' wages) .

In the private sector, the affordability of lowest price generics in the public sector was good for some conditions, with standard treatment costing a days' wage or less. Treatments costing over a days' wage of the lowest paid government worker include Diabetes Metformin 500mg cap/tab 1 cap/tab x 3 x 30 days(1.5 days' wages), Hypertension Amlodipine 5 mg cap/tab 1 cap/tab x 30 days (1.2 days' wages), Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (1.7 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (1.4 days' wages), Hypercholesterolaemia Atorvastatin 20mg cap/tab 1 cap/tab x 30 days(1.6 days' wages), Hypertension Lisinopril 10mg cap/tab 1 cap/tab x 2 x 30 days (3.1 days' wages), Hypertension Losartan 1 cap/tab x 30 days (4.7 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.1 days' wages).

When originator brand medicines are prescribed and dispensed in the private sector, several treatments cost well over one days' wage. For example, treating Hypercholesterolaemia with Atorvastatin costs 7.7 days' wages, while treating Ulcer with Omeprazole costs 11.5 days' wages.

It should be noted that treatment costs refer to medicines only and do not include the additional costs of consultation and diagnostic tests. Further, many people in China earn less than the lowest government wage; as such even treatments which appear affordable are too costly for the poorest segments of the population. Finally, even where individual treatments appear affordable, individuals or families who need multiple medications may quickly face unmanageable drug costs. An example is provided below of a family where the father has ulcer and the child has asthma. If the family is earning the equivalent of the lowest-paid government worker's salary, total treatment costs are 0.8 days' wages in the public sector and 0.8 days' wages in the private sector if the lowest price generics are purchased. If originator brands are purchased, treatment costs are 13.6 days' wages in the public sector(Table 17).

Table 17. Affordability of treatment for a family with diabetes and asthma: Number of days' wages of the lowest paid government worker needed to purchase standard treatments

	Lowest price generic - public sector	Lowest price generic - private sector	Originator brand - public sector	Originator brand-private sector
Father - omeprazole	0.5	0.6	12.9	11.5
Child – salbutamol inhaler	0.3	0.2	0.7	0.2

Total days' wages for one month treatment	0.8	0.8	13.6	11.7
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7. International comparisons

In every WHO/HAI survey, data is collected on the same global list medicines with the same dosage forms and strengths, which allows for comparisons to be made across countries. A series of 5 countries were selected for international comparisons of the availability, medicines price ratios and affordability found in this survey. Countries were selected based on similar in terms of economic wealth and development. Country data were obtained from the global database of survey results available on the HAI website (<http://www.haiweb.org/medicineprices/>). Given the wide variation in the public health systems of different countries, results are presented for the private for-profit sector.

7.1 International comparisons of public sector procurement prices

Results for individual medicines (Figure 5, Figure 6) showed that government procurement prices in Shaanxi, China(2012) are higher than those in Hyderabad, India(2005), Thailand (2006), Mongolia (2004) and Gauteng, South Africa(2004). Overall, China's public sector appears to be purchasing medicines less efficiently than other countries.

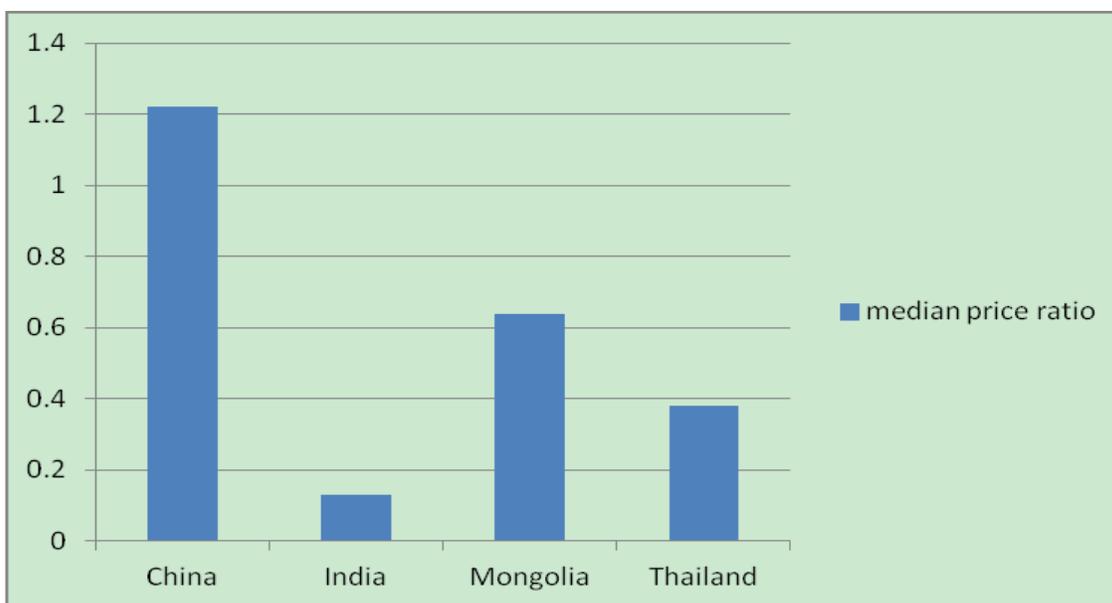


Figure 5. Ratio of local price to international reference price for lowest priced generic Omeprazole, cap/tab, 20mg in 4 countries

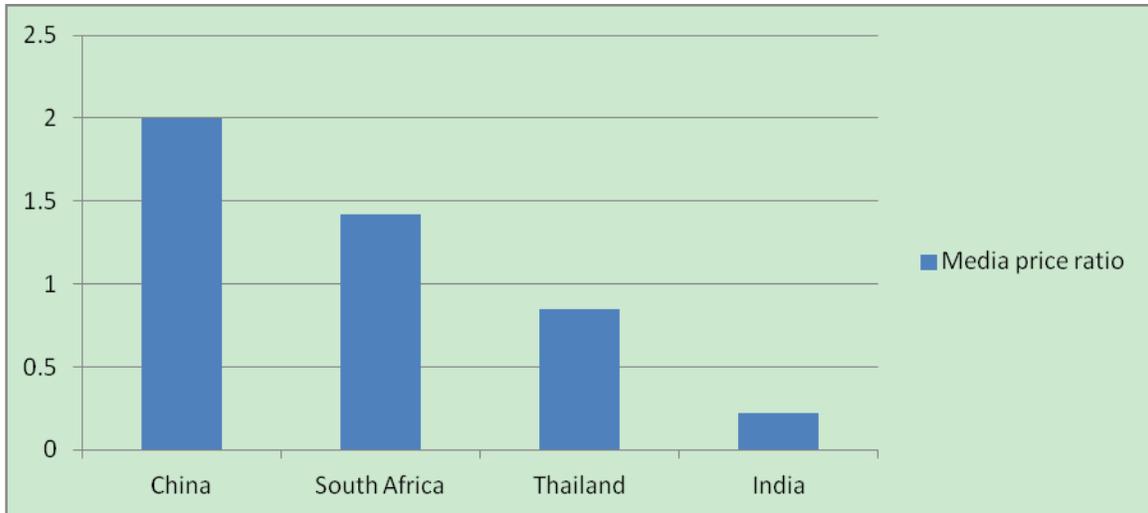


Figure 6. Ratio of local price to international reference price for lowest priced generic Metformin, cap/tab, 500mg in 4 countries

7.2 International comparisons of private sector prices

As shown in Figure 7 and Figure 8, Omeprazole originator brand price in China was higher than that in South Africa. With respect to generic medicine, the price in China was lower than that in South Africa and higher than that in India, Mongolia and Thailand. As for Salbutamol, the result showed that originator brand medicine price in China was higher than that in India and lower than that in Thailand and South Africa. With respect to generic medicine, China's medicine is lower than that in India, Mongolia and South Africa.

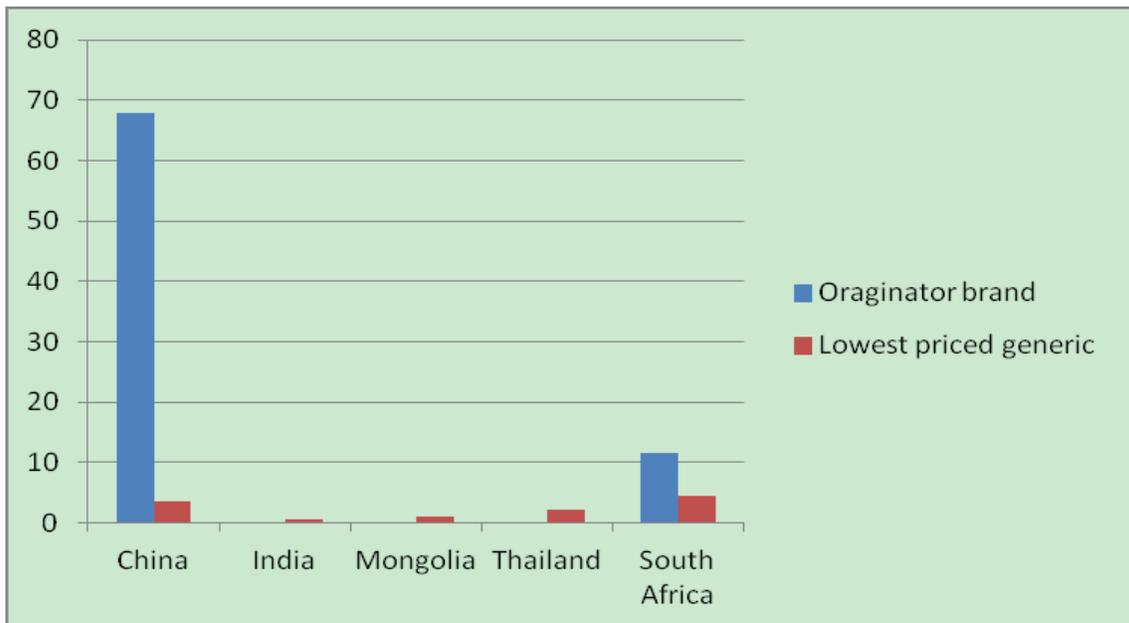


Figure 7. Ratio of local price to international reference price for Omeprazole, cap/tab, 20mg in 5 countries

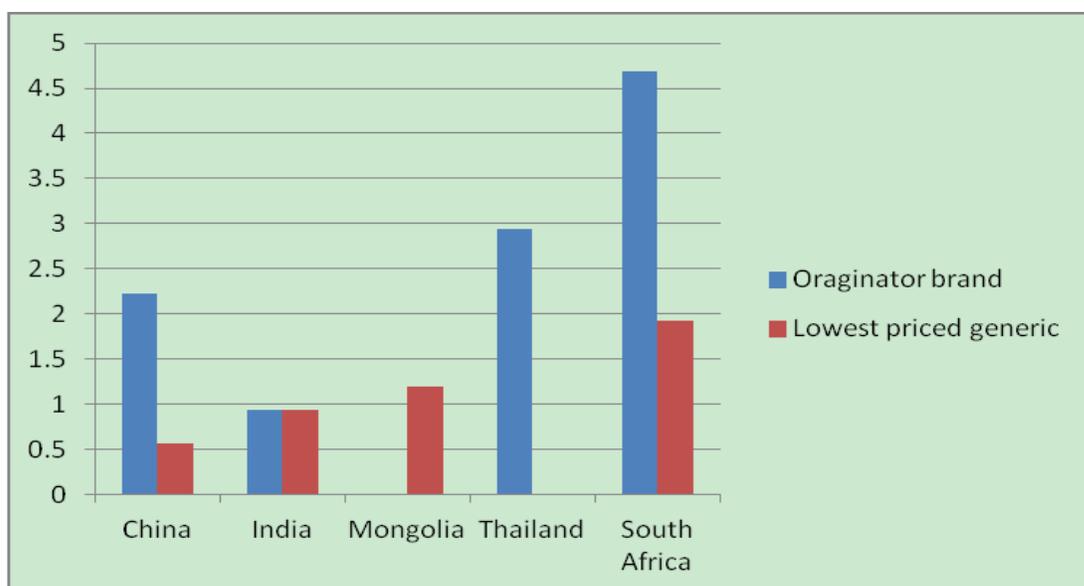


Figure 8. Ratio of local price to international reference price for Salbutamol, inhaler, 100 mcg/dose in 5 countries

7.3 International comparisons of private sector availability

Results for individual medicines (Table 18) showed that the availability of originator brand Omeprazole 20mg tab/cap in China (Shaanxi Province) was lower than those in South Africa, and higher than those in Thailand, India and Mongolia. With respect to generic medicines, availability in China was similar to those in Mongolia, lower than those in Thailand and India, and higher than those in South Africa.

Table 18. Availability of Omeprazole, cap/tab, 20mg in private retail pharmacies in 5 countries

Survey	Mean availability (%)	
	Originator brand	Lowest priced generic
China	30.0	75.8
Thailand	14.3	100
India	0	91.7
South Africa	83.3	50
Mongolia	0	80

Results for individual medicines (Table 19) showed that the availability of originator brand Salbutamol inhaler in China is similar to those in India, lower than those in Thailand and South Africa, and higher than those in Mongolia. With respect to generic medicines, availability in China is similar to those in Mongolia, lower than those in South Africa and India, and higher than those in Thailand based on this data.

Table 19. Availability of Salbutamol inhaler, 100 mcg/dose in private retail pharmacies in 5 countries

Survey	Mean availability (%)	
	Originator brand	Lowest priced generic
China	30.6	61.1
Thailand	100	0
India	31.3	72.9
South Africa	83.3	96.7
Mongolia	4.0	60

7.4 International comparisons of private sector affordability

Figure 9 showed that in the selected countries, treatment of asthma using Salbutamol inhaler costs between 0.2 and 1.2 days' wages when lowest price generics are purchased from the private sector. In China, the lowest paid government worker would need to spend 0.2 days' wages to purchase the lowest price generic, which shows a better affordability compared with most other countries. When the originator brand is purchased, the affordability ranges from 0.6 to 1.3 days' wages across the selected countries. In China, the lowest paid government worker would need to spend 0.7 days' wages to purchase the originator brand, which shows a better affordability compared with most other countries.

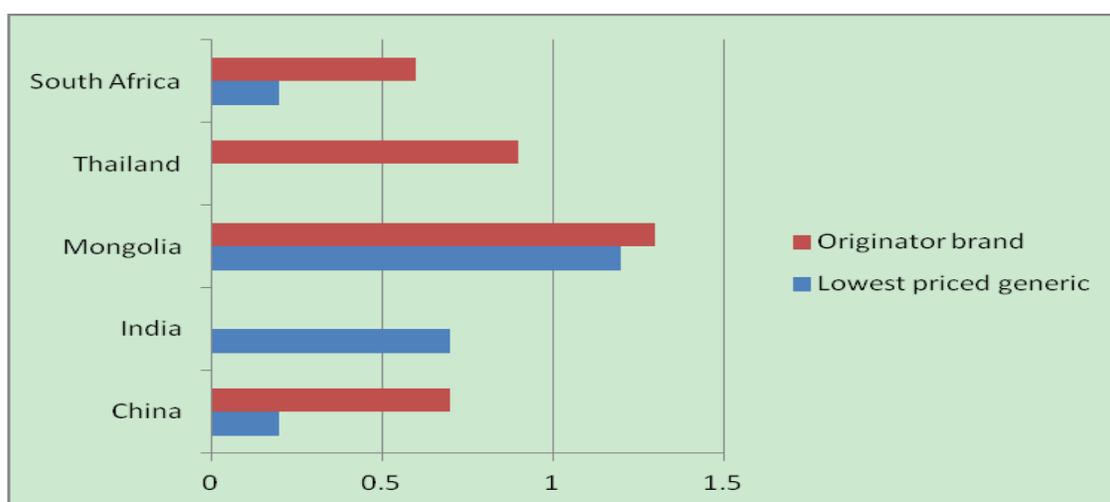


Figure 9. Number of days' wages of the lowest paid government worker needed to buy Salbutamol inhaler, 0.1mg/dose for the treatment of asthma (1 inhaler of 200 doses) in the private sector

Discussion

The Department of Pharmacy Administration, Faculty of Pharmacy, School of Medicine, Xi'an Jiaotong University has carried out a study to measure the availability and prices of 49 medicines in China using an international standardized methodology. Results indicate that in the public sector, the procurement of medicines is relatively inefficient, as shown by purchase prices higher than international reference prices. By the time these medicines are sold to patients, prices have increased by 13.4% as a result of add-on costs in the public sector distribution chain.

Availability of generic medicines in the public sector is poor. The average availability across all survey medicines was 20.0%, while the availability of medicines on the national EML was 23.9%.

- Generics with particularly low availability in the public sector include Acyclovir(4.2%), Atenolol(0%), Beclometasone inhaler(0%), Cefradine(1.7%), Cimetidine(0%), Ciprofloxacin(0.8%), Diazepam(0.8%), Diclofenac(3.3%), Erythromycin(0%), Fluconazole(5.0%), Fluoxetine(2.5%), Glibenclamide(1.7%), Ibuprofen(0.8%), Lisinopril(1.7%), Metformin(3.3%), Ofloxacin(0%), Paracetamol(3.3%), Salbutamol inhaler(4.2%).
- Given the low availability of medicines in the public sector, it can be concluded that many patients must purchase medicines from the private sector.
- Originator brand medicines are rarely/not available in the public sector; however, this is only an issue where high quality generics are not available.

In the private sector, generic equivalents were the predominant product type found. Mean availability in the private sector was 29.2% for lowest price generic medicines and 12.6% for originator brands. Generics with particularly low availability in the private sector include Abendazole(4.2%), Atenolol(0%), Beclometasone inhaler(0%), Cefradine(6.7%), Cimetidine(2.5%), Diazepam(0%), Fluoxetine(1.7%), Glibenclamide(1.7%), Ibuprofen(3.3%), Ketoconazole(0.8%), Lisinopril(5.8%), Ofloxacin(2.5%), Paracetamol(5.8%), Phenytoin(3.3%).

Final patient prices for lowest price generic medicines in the public sector are fair. Lowest price generic medicines were priced at 1.69 times their international reference price, while originator brand medicines were very high priced at 11.83 times their international reference price. There is a common misconception that generics are inferior to the originator brands in both quality and efficacy, leading to the fact that the government is buying high priced originator brands when lower priced generics are available. Compared with the public sector, private sector patient prices were, on average, -13.4% and 24.3% higher for originator brands and generic equivalents, respectively. Lowest price generic medicines were priced at 1.86 times their international reference price, while originator brand medicines were priced at 10.72 times their international reference price. These results shows that patients are paying significantly more to purchased originator products as compared to lowest price generics.

Medicines were not found to be priced consistently with respect to their international reference price. In the public sector, half of lowest price generic medicines were priced between 0.64 and 5.07 times their international reference price, while half of originator brand medicines were priced between 6.76 and 27.61 times their international reference price. In the private sector, half of lowest price generic medicines were priced between 0.56 and 5.89 times their international reference price, while half of originator brand medicines were priced between 6.55 and 23.16 times their international reference price.

The interquartile range for the median price ratios of individual medicines shows the variability in the medicine price across medicine outlets. In the public sector, results show a large amount of variation in price across outlets. In the private sector, a wide amount of variation in price across outlets is observed. The high degree of variability observed between outlets is likely the result of the absence of price regulations.

In the public sector, the affordability of lowest price generics was good for most conditions, with standard treatment costing a days' wage or less. However, low public sector availability obliges many patients to purchase medicines from the private sector. In the private sector, the majority of treatments cost substantially less than the daily wage of the lowest paid government worker when lowest price generics are used. The treatment of Diabete Metformin 500mg cap/tab 1 cap/tab x 3 x 30 days(1.5 days' wages), Hypertension Amlodipine 5 mg cap/tab 1 cap/tab x 30 days (1.2 days' wages), Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (1.7 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (1.4 days' wages), Hypercholesterolaemia Atorvastatin 20mg cap/tab 1 cap/tab x 30 days(1.6 days' wages), Hypertension Lisinopril 10mg cap/tab 1 cap/tab x 2 x 30 days (3.1 days' wages), Hypertension Losartan 1 cap/tab x 30 days (4.7 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.1 days' wages) are clearly unaffordable even when generics are used. If originator brands and prescribed and dispensed, the lowest paid government worker would need to spend between 0.7 (Asthma Salbutamol 1 inhaler of 200 doses) to 11.5 (Ulcer Omeprazole 1 cap/tab x 30 days) days' wages to purchase medicines from the private sector. The majority of standard treatments are unaffordable when originator brand medicines are purchased in the private sector.

It should be noted that many people in China earn much less than the lowest government wage; as such even treatments which appear affordable are too costly for the poorest segments of the population. Given that 10.9% of the population are living below the international poverty line of less than \$1/day, even treatments which appear affordable are financially out-of-reach for a substantial number of people.

The results of the international comparison suggest that China generally has greater availability, greater prices, and similar affordability, than the other countries included in the analysis.

More in-depth analysis, considering additional factors like size of the markets; capabilities of the national pharmaceutical manufacturing sector; the effect of taxes; duties and mark-ups at national and local levels; and economic indicators; is needed to

reveal the reasons for variation between different countries. Such information can be useful for policymakers and governments in deciding whether any appropriate interventions can be made to make medicines more affordable and accessible in each country. Further studies and comparisons between high and low-income countries can also provide an evidence base for equity or differential pricing strategies by multinational manufacturers whereby less wealthy populations pay less than wealthier countries for essential medicines.

The results of this medicine price survey provide insight into the availability, price and affordability of medicines in China. The use of the WHO/HAI medicine prices survey has allowed for the measurement of medicine prices and availability in a reliable and standardized way that enables valid international comparisons to be made. A further strength of the methodology are the multiple steps taken to ensure data quality: training of survey personnel including a data collection pilot test; pairs of data collectors to cross-check results; double entry and verification of data into the computerized survey *Workbook*; data checker function in *Workbook* that identifies outlier or erroneous entries; and quality control checks at multiple stages.

Study results may be limited by the fact that data are inherently subject to outside influences such as market fluctuations and delivery schedules. In addition, the reliability of median price ratios is dependent on the number of supplier prices used to determine the median MSH international reference price of each medicine. In cases where very few supplier prices are available, or where there is no supplier price and the buyer price is used as a proxy, MPR results can be skewed by a particularly high/low international reference price. A further limitation is that availability is determined for the list of survey medicines, and therefore does not account for the availability of alternate strengths or dosage forms, or of therapeutic alternatives. Finally, the methodology does not include informal sectors, such as markets and general stores, as the quality of the medicines found in such sectors cannot be assured.

Recommendations and conclusion

In Shaanxi Province, the availability of the surveyed medicines was extremely low in both the public and private sectors. In both the private and public sectors, considerable price differences were seen between originator brands and generics. In the public sector, innovator brands were 10.14 times more expensive than the lowest priced generic. In the private sector the difference was 8.15 times. Generic medicines were cheaper and brand medicines were more expensive in the public sector compared to the private sector. Medicines are often unaffordable for ordinary citizens. The treatment of a chronic disease such as arthritis, where prices are high, availability low and affordability poor, warrants urgent attention.

The results of this preliminary analysis suggest that a mix of policies need to be implemented to make medicines more affordable and available. Although further investigation is required to obtain a more in-depth understanding of the causes and consequences of medicine pricing and availability, the results of this survey provide

broad directions for future research and action. It is therefore recommended that the following steps be taken to improve medicine prices, availability and affordability:

- In order to more fully study the availability of medicines, an extended survey should be conducted in many other provinces of China.
- An in-depth study of the medicine distribution process should be initiated to reveal the real picture of add-on costs. Distribution channels and their effect on prices should be researched, and factors influencing the purchasing and selling behavior of wholesalers and retailers should be identified as well as the setting of the manufacturer's selling price and maximum retail price.
- The government should further develop its medicine pricing policy. In the public sector, the government should strengthen the pharmaceutical centralized public bidding mechanism (tenders) in order to lower medicine prices in the public sector. The pharmaceutical centralized public bidding mechanism should be more efficient.
- 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 government finance. Greater acceptance and use of quality-assured generic medicines and essential medicines (by health professionals and consumers) must be encouraged.
- The impact of policy changes should be measured by establishing a monitoring system to regularly monitor the price, availability and affordability of medicines.

This study has helped to provide broad insight into current issues related to the price, availability and affordability of key medicines for the treatment of common conditions. The results highlight priority areas for action for the Ministry of Health and others in improving access to affordable medicines. Broad debate and dialogue are now needed to identify how best different players can contribute to the prospect of enhancing accessibility and affordability to essential medicines.

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Annex 1. List of Core and Supplementary Medicines

List	No.	Disease	Name	Strength	Dosage form	Originator brand, Manufacturer
Global core list	1	Asthma	Salbutamol	100 mcg/dose	inhaler	Ventoline/GSK
	2	Diabetes	Glibenclamide	5 mg	cap/tab	Daonil/Sanofi-Aventis
	3	Cardiovascular disease	Atenolol	50 mg	cap/tab	Tenormin/AstraZeneca
	4	Cardiovascular disease	Captopril	25 mg	cap/tab	Capoten/BMS
	5	Cardiovascular disease	Simvastatin	20 mg	cap/tab	Zocor/MSD
	6	Depression	Amitriptyline	25 mg	cap/tab	Tryptizol/MSD
	7	Infectious disease	Ciprofloxacin	500 mg	cap/tab	Ciproxin/Bayer
	8	Infectious disease	Amoxicillin	500 mg	cap/tab	Amoxil/GSK
	9	Infectious disease	Ceftriaxone	1 g/vial	injection	Rocephin/Roche
	10	CNS	Diazepam	5 mg	cap/tab	Valium/Roche
	11	Pain/inflammation	Diclofenac	50 mg	cap/tab	Voltarol/Novartis
	12	Ulcer	Omeprazole	20 mg	cap/tab	Losec/AstraZeneca
Regional core list	13	Intestinal parasite	Albendazole	200mg	cap/tab	Zentel/GSK
	14	Cardiovascular disease	Amlodipine	5mg	cap/tab	Norvasc/Prizer
	15	Cardiovascular disease	Atorvastatin	20mg	cap/tab	Liptor/ Prizer
	16	Asthma	Beclometasone inhaler	50mcg/dose	dose	Becotide/GSK
	17	Infection disease	Cephalexin	250mg	cap/tab	Keflex/Eli Lilly
	18	Cardiovascular disease	Enalapril	10mg	cap/tab	Renitec/MSD
	19	Depression	Fluoxetine	20mg	cap/tab	Prozac/Eli Lilly
	20	Diabetes	Gliclazide	80mg	cap/tab	Diamicon/Servier
	21	Cardiovascular disease	Hydrochlorothiazide	25mg	cap/tab	Dichlotride/MSD
	22	Pain/inflammation	Ibuprofen	400mg	cap/tab	Brufen/Knoll
	23	Diabetes	Metformin	500mg	cap/tab	Glucophage/BMS
	24	Infection disease	Metronidazole	200mg	cap/tab	Flagyl/Sanofi-Aventis
	25	Hypertension	Nifedipine Retard	20mg	cap/tab	Adalat/Bayer
	26	Ulcer	Ranitidine	150mg	cap/tab	Zantac/GSK
	27	Mania	Sodium Valproate	200mg	cap/tab	Epilim/ Sanofi-Aventis
Supplementary list	28	Infection disease	Co-trimoxazole	80mg+400mg	cap/tab	Bactrim/Roche
	29	Pain/inflammation	Paracetamol	500mg	cap/tab	Panadol/GSK
	30	Viral	Aciclovir	200mg	cap/tab	Zovirax/GSK
	31	Epilepsy	Carbamazepine	100mg	cap/tab	Tegretol/Novartis
	32	Infection disease	Cefradine	500mg	injection	Velosef/B-M Squibb
	33	Cardiovascular	Digoxin	0.25mg	tab	Lanixin/GSK
	34	Infection disease	Fluconazole	150mg	cap/tab	Diflucan/Prizer
	35	Infection disease	Ketoconazole	200mg	tab	Nizoral/Janssen
	36	Cardiovascular disease	Losartan	50mg	tab	Cozaar/MSD
	37	Epilepsy	Phenytoin	50mg	cap/tab	Epanutin/Prizer
	38	Tuberculosis	Rifampicin	150mg	tab	Rimactane/Novartis
	39	Hypertension	Lovastatin	20mg	cap/tab	Mevacor/Merk
	40	Infection disease	Ofloxacin	200mg	tab	Tarivid/Aventis

41	Asthma	Aminophylline	100mg	tab	
42	Fungal infection	Miconazole Nitrate	2%	cream	Daktarin/Janssen
43	Infection disease	Erythromycin	250mg	tab	Pantomicina/ABBOTT
44	Infection disease	Azithromycin	250mg	cap/tab	Zithromax/Pfizer
45	Ulcer	Cimetidine	200mg	tab	Tagamet/Smithkline
46	Hypertension	Lisinopril	10mg	tab	Zestril/AstraZeneca
47	Anaphylaxis	Loratadine	10mg	tab	Clarityne/Schering Plough
48	Infectious disease	Ceftazidime injection	1g/vial	vial	Fortum /GSK
49	Cardiovascular disease	Isosorbide mononitrate	20mg	caps/tab	Imdur /AstraZeneca

Annex 2. Medicine data collection form

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Albendazole 200 mg cap/tab 阿苯达唑（非咀嚼 片）	OB 原研药	Zentel 肠虫清	GSK 葛兰素史克		2			per cap/tab	
	LPG 仿制药				2			per cap/tab	
Amitriptyline 25 mg cap/tab 阿米替林	OB 原研药	Tryptizol 阿米替林	MSD 默沙东		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Amlodipine 5 mg cap/tab 氨氯地平	OB 原研药	Norvasc 络活喜	Pfizer 辉瑞		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Amoxicillin 500 mg cap/tab 阿莫西林	OB 原研药	Amoxil 奥纳欣	Squibb 施贵宝		21			per cap/tab	
	LPG 仿制药				21			per cap/tab	
Atenolol 50 mg cap/tab 阿替洛尔	OB 原研药	Tenormin 天诺敏	AstraZeneca 阿斯利康		60			per cap/tab	
	LPG 仿制药				60			per cap/tab	
Atorvastatin 20 mg cap/tab 阿托伐他汀	OB 原研药	Lipitor 立普妥	Pfizer 辉瑞		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Beclometasone inhaler 50 mcg/dose dose 倍氯米松 (气雾剂)	OB 原研药	Becotide 必可酮	GSK 葛兰素史克		200			per dose	
	LPG 仿制药				200			per dose	
Captopril 25 mg cap/tab 卡托普利	OB 原研药	Capoten 开博通	BMS 百时美施贵宝		60			per cap/tab	
	LPG 仿制药				60			per cap/tab	
Ceftriaxone injection 1 g/vial vial 头孢曲松 (注射剂)	OB 原研药	Rocephin 罗氏芬	Roche 罗氏		1			per vial	
	LPG 仿制药				1			per vial	
Cephalexin 250 mg cap/tab 头孢氨苄	OB 原研药	Keflex 先锋IV	Eli Lilly 礼来		28			per cap/tab	
	LPG 仿制药				28			per cap/tab	
Ciprofloxacin 500 mg cap/tab 环丙沙星	OB 原研药	Ciproxin 西普乐	Bayer 拜耳		10			per cap/tab	
	LPG 仿制药				10			per cap/tab	
Diazepam 5 mg cap/tab 地西洋	OB 原研药	Valium 安定	Roche 罗氏		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Diclofenac 50 mg cap/tab 双氯酚酸	OB 原研药	Voltarol 扶他林	Novartis 诺华		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Enalapril 10 mg cap/tab 依那普利	OB 原研药	Renitec 悦宁定	MSD 默沙东		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Fluoxetine 20 mg cap/tab 氟西汀	OB 原研药	Prozac 百忧解	Eli Lilly 礼来		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Glibenclamide 5 mg cap/tab 格列本脲	OB 原研药	Daonil 达安辽	Sanofi-Aventis 赛诺菲安万特		60			per cap/tab	
	LPG 仿制药				60			per cap/tab	
Gliclazide 80 mg cap/tab 格列齐特	OB 原研药	Diamicon 达美康	Servier 施维雅		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Hydrochlorothiazide 25 mg cap/tab 氢氯噻嗪	OB 原研药	Dichlotride 氢氯噻嗪	MSD 默沙东		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Ibuprofen 400 mg cap/tab 布洛芬	OB 原研药	Brufen 布洛芬	Knoll 诺尔		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Metformin 500 mg cap/tab 二甲双胍	OB 原研药	Glucophage 格华止	BMS 百时美施贵宝		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Metronidazole 200 mg cap/tab 甲硝唑	OB 原研药	Flagyl 灭滴灵	Sanofi-Aventis 赛诺菲安万特		28			per cap/tab	
	LPG 仿制药				28			per cap/tab	
Nifedipine Retard 20 mg tab 硝苯地平 (缓释片)	OB 原研药	Adalat Retard 拜新同	Bayer 拜耳		30			per tab	
	LPG 仿制药				30			per tab	
Omeprazole 20 mg cap/tab 奥美拉唑	OB 原研药	Losec 洛赛克	AstraZeneca 阿斯利 康		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Ranitidine 150 mg cap/tab 雷尼替丁	OB 原研药	Zanta c 善胃得	GSK 葛兰素史克		60			per cap/tab	
	LPG 仿制药				60			per cap/tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Salbutamol inhaler 100 mcg/dose dose 沙丁胺醇 (气雾剂)	OB 原研药	Ventoline 舒喘灵	GSK 葛兰素史克		200			per dose	
	LPG 仿制药				200			per dose	
Simvastatin 20 mg cap/tab 辛伐他汀	OB 原研药	Zocor 舒降之	MSD 默沙东		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Sodium Valproate 200 mg cap/tab 丙戊酸钠	OB 原研药	Epilim 艾匹灵	Sanofi-Aventis 赛诺菲安万特		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Aciclovir 200 mg tab 阿昔洛韦	OB 原研药	Zovirax 苏维乐	GSK 葛兰素史克		25			per tab	
	LPG 仿制药				25			per tab	
Aminophylline 100 mg tab 氨茶碱	LPG 仿制药							per tab	
Azithromycin 250 mg cap/tab 阿奇霉素	OB 原研药	Zithromax 希舒美	Pfizer 辉瑞					per cap/tab	
	LPG 仿制药							per cap/tab	
Carbamazepine 200 mg tab 卡马西平	OB 原研药	Tegretol 得理多	Novartis 诺华		100			per tab	
	LPG 仿制药				100			per cap/tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Cefradine 500 mg injection 头孢拉定 (注射剂)	OB 原研药	Velosef 泛捷复	BMS 百时美施贵宝		1			per vial	
	LPG 仿制药				1			per vial	
Co-trimoxazole 80mg+400mg cap/tab 复方新诺明	OB 原研药	Bactrim 复方新诺明	Roche 罗氏		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Cimetidine 400mg tab 西咪替丁	OB 原研药	Tagamet 泰为美	Smithkline 史克		100			per tab	
	LPG 仿制药				100			per tab	
Ceftazidime 1g/vial vial 头孢他啶 (注射剂)	OB 原研药	Fortum 复达欣	GSK 葛兰素史克		1			per vial	
	LPG 仿制药				1			per vial	
Digoxin 0.25 mg tab 地高辛	OB 原研药	Lanoxin 拉诺辛	GSK 葛兰素史克		100			per tab	
	LPG 仿制药				100			per tab	
Erythromycin 250 mg tab 红霉素	OB 原研药	Pantomicina 红霉素	ABBOTT 雅培					per tab	
	LPG 仿制药							per tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Fluconazole 150mg cap/tab 氟康唑	OB 原研药	Diflucan 大扶康	Prizer 辉瑞		30			per cap/tab	
	LPG 仿制药				30			per cap/tab	
Isosorbide mononitrate 20mg caps/tab 单硝酸异山梨酯	OB 原研药	Imdur 依姆多	AstraZeneca 阿斯利 康		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Ketoconazole 200 mg tab 酮康唑	OB 原研药	Nizoral 里素劳片	Janssen 杨森		10			per tab	
	LPG 仿制药				10			per tab	
Lisinopril 10mg tab 赖诺普利	OB 原研药	Zestril 捷赐瑞	AstraZeneca 阿斯利 康		14			per tab	
	LPG 仿制药				14			per tab	
Loratadine 10mg tab 氯雷他定	OB 原研药	Clarityne 开瑞坦	Schering Plough 先灵葆雅		6			per tab	
	LPG 仿制药				6			per tab	
Losartan 50 mg tab 氯沙坦	OB 原研药	Cozaar 科素亚	MSD 默沙东		30			per tab	
	LPG 仿制药				30			per tab	

药品名 规格 剂型	种类	商品名	生产商	是否 可及	推荐 包装	可及包 装	可及包 装价格	单位价格	备注
Lovastatin 20 mg tab 洛伐他汀	OB 原研药	Mevacor 美降脂	Merk 默克		60			per tab	
	LPG 仿制药				60			per tab	
Miconazole Nitrate 2% cream 硝酸咪康唑	OB 原研药	Miconazole Nitrate 达克宁	Janssen 杨森		20			per G	
	LPG 仿制药				20			per G	
Ofloxacin 200 mg tab 氧氟沙星	OB 原研药	Tarivid 泰利必妥	Aventis 安万特		100			per tab	
	LPG 仿制药				100			per tab	
Paracetamol 500mg cap/tab 扑热息痛	OB 原研药	Panadol 必理通	GSK 葛兰素史克		60			per cap/tab	
	LPG 仿制药				60			per cap/tab	
Phenytoin 100 mg cap/tab 苯妥英	OB 原研药	Epanutin 地伦丁	Prizer 辉瑞		100			per cap/tab	
	LPG 仿制药				100			per cap/tab	
Rifampicin 150 mg tab 利福平	OB 原研药	Rimactan 甲哌利复霉素	Novartis 诺华		100			per tab	
	LPG 仿制药				100			per tab	

Annex 3. Availability of individual medicines in public and private sectors

Medicine Name	National EML (yes/no)	% outlets where medicine was found Public sector (n = 120 outlets)		% outlets where medicine was found Private sector (n = 120 outlets)	
		Originator brand	Lowest price generic	Originator brand	Lowest price generic
Acyclovir	Yes	0	4.2	0.8	22.5
Albendazole	Yes	24.2	8.3	60.8	4.2
Aminophylline	Yes	0	70.8	0	65.8
Amitriptyline	Yes	0	10	0.8	9.2
Amlodipine	No	30.8	16.7	51.7	32.5
Amoxicillin	Yes	0	35.8	0	75.0
Atenolol	Yes	0	0	0.8	0
Atorvastatin	No	30.8	5	53.3	7.5
Azithromycin	Yes	3.3	47.5	10.0	75.8
Beclometasone inhaler	No	0	0	10.0	0
Captopril	Yes	73.3	3.3	0	80.8
Carbamazepine	Yes	3.3	2.5	10.8	10.0
Cefradine	No	0	1.7	0	6.7
Ceftriaxone injection	Yes	55.0	20.8	1.7	30.8
Cephalexin	Yes	0	10.8	0	26.7
Cimetidine	No	0	0	3.3	2.5
Ciprofloxacin	Yes	0	0.8	0	6.7
Co-trimoxazole	Yes	0.8	31.7	0.8	59.2
Diazepam	Yes	0	0.8	0	0
Diclofenac	Yes	2.5	3.3	6.7	20.8
Digoxin	Yes	0.8	57.5	0	53.3
Enalapril	Yes	0	55.8	0	75.0
Erythromycin	Yes	0	0	0	14.2
Fluconazole	Yes	0	5.0	0	19.2
Fluoxetine	No	4.2	2.5	19.2	1.7
Glibenclamide	Yes	0	1.7	0	1.7
Gliclazide	No	16.7	24.2	35.0	45.0
Hydrochlorothiazide	Yes	0	63.3	0	55.8
Ibuprofen	Yes	0.8	0.8	0.8	3.3
Ketoconazole	No	16.7	0	46.7	0.8
Lisinopril	No	0	1.7	0	5.8
Loratadine	No	9.2	23.3	42.5	60.0
Losartan	No	12.5	8.3	19.2	11.7

Lovastatin	No	0	10.8	0	39.2
Metformin	Yes	18.3	3.3	30.0	20.0
Metronidazole	Yes	0.8	76.7	0	60.8
Miconazole Nitrate	Yes	56.7	6.7	78.3	11.7
Nifedipine Retard	No	4.2	18.3	23.3	39.2
Ofloxacin	No	0	0	0	2.5
Omeprazole	Yes	17.5	63.3	30.0	75.8
Paracetamol	Yes	0.8	3.3	1.7	5.8
Phenytoin	Yes	0	6.7	0	3.3
Ranitidine	Yes	0	39.2	0	68.3
Rifampicin	Yes	0.8	22.5	0	43.3
Salbutamol inhaler	Yes	25.8	4.2	25.0	14.2
Simvastatin	Yes	17.5	10	30.8	52.5
Sodium Valproate	Yes	0	21.7	0.8	50.0
Ceftazidime Injection	Yes	10.0	35.8	1.7	10.8
Isosorbide Mononitrate	Yes	35.0	16.7	7.5	49.2

Annex 4. Median Price Ratios, public sector procurement prices

Medicine Name	Originator brand MPR (25 th , 75 th %iles)	Lowest price generic MPR (25 th , 75 th %iles)
Acyclovir		0.35(0.35,1.60)
Albendazole	5.43(5.43,5.43)	1.61(1.61,1.61)
Aminophylline		0.25(0.24,0.25)
Amitriptyline		2.91(2.91,3.03)
Amlodipine	24.41(24.41,24.41)	6.29(5.09,6.48)
Amoxicillin		2.60(0.80,3.87)
Atenolol		
Atorvastatin	23.07(23.07,23.07)	15.39(15.39,15.39)
Azithromycin	8.89(8.89,8.89)	0.50(0.45,1.35)
Beclometasone inhaler	2.69(2.69,2.69)	
Captopril		0.33(0.26,0.43)
Carbamazepine	8.28(8.28,8.92)	
Cefradine		
Ceftriaxone injection	13.16(13.16,13.16)	0.33(0.33,0.76)
Cephalexin		0.47(0.46,0.59)
Cimetidine		
Ciprofloxacin		
Co-trimoxazole		0.94(0.70,0.96)
Diazepam		
Diclofenac		20.05(20.05,22.69)
Digoxin		1.51(1.51,1.51)
Enalapril		8.28(8.28,8.28)
Erythromycin		
Fluconazole		21.82(10.56,28.85)
Fluoxetine	119.40(115.39,123.40)	
Glibenclamide		
Gliclazide	2.55(2.55,2.55)	0.88(0.55,2.59)
Hydrochlorothiazide		0.43(0.43,1.29)
Ibuprofen		
Ketoconazole	6.34(6.34,6.34)	
Lisinopril		
Loratadine	22.37(22.37,22.37)	17.54(5.60,17.54)
Losartan	35.76(35.76,35.76)	28.96(28.96,28.96)
Lovastatin		26.33(26.33,26.33)
Metformin	19.04(19.04,19.04)	2.00(0.73,4.41)
Metronidazole		0.71(0.55,0.93)
Miconazole Nitrate	7.63(7.63,7.63)	1.38(1.27,1.41)
Nifedipine Retard	31.08(31.08,31.08)	4.44(3.98,4.44)
Ofloxacin		
Omeprazole	62.06(62.06,62.06)	1.22(0.90,4.68)
Paracetamol		1.84(0.49,3.68)

Phenytoin		0.52(0.46,0.58)
Ranitidine		0.60(0.35,0.60)
Rifampicin		0.09(0.08,0.09)
Salbutamol inhaler	1.91(1.91,1.9)	1.49(1.49,1.49)
Simvastatin	8.12(8.12,8.12)	4.78(4.11,6.34)
Sodium Valproate		0.27(0.25,0.27)
Ceftazidime injection	1.90(1.90,1.90)	0.41(0.14,0.41)
Isosorbide mononitrate		2.31(2.31,2.31)

Annex 5. Median Price Ratios, public sector patient prices

Medicine Name	Originator brand MPR (25 th , 75 th %iles)	Lowest price generic MPR (25 th , 75 th %iles)
Acyclovir		0.41(0.41,1.83)
Albendazole	6.35(6.26,7.25)	1.69(1.69,1.69)
Aminophylline		0.47(0.29,0.53)
Amitriptyline		3.49(3.36,3.62)
Amlodipine	28.18(28.18,28.18)	6.72(5.92,7.51)
Amoxicillin		3.56(1.25,5.24)
Atenolol		
Atorvastatin	27.04(27.04,27.04)	19.16(18.33,19.44)
Azithromycin	10.29(10.23,10.77)	0.79(0.47,1.55)
Beclometasone inhaler	3.13(3.12,3.13)	
Captopril		0.44(0.33,0.58)
Carbamazepine	11.83(10.84,12.47)	
Cefradine		
Ceftriaxone injection	15.13(15.13,15.13)	0.60(0.35,0.88)
Cephalexin		0.67(0.53,1.24)
Cimetidine		
Ciprofloxacin		
Co-trimoxazole		1.12(1.02,1.22)
Diazepam		
Diclofenac		27.57(25.25,30.38)
Digoxin		1.74(1.63,1.75)
Enalapril		10.60(8.90,12.98)
Erythromycin		
Fluconazole		25.83(12.80,32.77)
Fluoxetine		
Glibenclamide		
Gliclazide	2.99(2.80,3.04)	1.00(0.69,2.99)
Hydrochlorothiazide		0.71(0.47,1.55)
Ibuprofen		
Ketoconazole	7.17(6.55,7.31)	
Lisinopril		
Loratadine	25.31(22.37,27.55)	15.01(8.45,20.60)
Losartan	42.19(40.67,42.19)	34.86(34.79,34.86)
Lovastatin		33.80(33.79,39.19)
Metformin	22.10(22.10,24.18)	2.04(0.86,5.09)
Metronidazole		0.92(0.73,1.25)
Miconazole Nitrate	8.86(7.81,8.92)	1.46(1.46,1.58)
Nifedipine Retard	36.53(35.82,36.56)	4.81(4.39,5.44)
Ofloxacin		
Omeprazole	75.69(68.76,75.69)	3.16(0.95,6.34)
Paracetamol		2.23(0.85,4.15)

Phenytoin		0.61(0.55,0.67)
Ranitidine		0.58(0.46,0.70)
Rifampicin		0.10(0.10,0.12)
Salbutamol inhaler	2.23(2.23,2.46)	0.92(0.73,1.57)
Simvastatin	9.67(9.55,9.67)	5.32(4.59,7.37)
Sodium Valproate		0.26(0.26,0.27)
Ceftazidime injection	2.18(2.18,2.18)	0.45(0.27,0.56)
Isosorbide mononitrate		2.65(2.22,2.66)

Annex 6. Median Price Ratios, private sector patient prices

Medicine Name	Originator brand MPR (25 th , 75 th %iles)	Lowest price generic MPR (25 th , 75 th %iles)
Acyclovir		1.86(0.83,1.92)
Albendazole	6.35(6.04,7.25)	3.93(1.69,6.04)
Aminophylline		0.44(0.44,0.57)
Amitriptyline		3.56(3.24,3.76)
Amlodipine	25.52(23.56,27.13)	6.66(4.60,7.69)
Amoxicillin		2.92(2.57,4.62)
Atenolol		
Atorvastatin	21.86(20.43,24.62)	4.59(4.54,9.48)
Azithromycin	10.25(10.17,10.33)	1.46(1.13,1.96)
Beclometasone inhaler	2.98(2.98,3.08)	
Captopril		0.40(0.37,0.57)
Carbamazepine	11.20(10.67,12.17)	0.51(0.48,0.55)
Cefradine		1.59(1.41,1.95)
Ceftriaxone injection		0.58(0.46,0.71)
Cephalexin		0.86(0.59,1.02)
Cimetidine	12.11(11.88,12.43)	
Ciprofloxacin		0.52(0.42,0.66)
Co-trimoxazole		1.05(0.96,1.12)
Diazepam		
Diclofenac	36.96(36.87,38.81)	29.57(27.72,32.34)
Digoxin		1.59(1.55,1.77)
Enalapril		10.60(5.98,12.58)
Erythromycin		0.52(0.51,0.54)
Fluconazole		20.44(6.36,33.94)
Fluoxetine	33.87(33.22,123.77)	
Glibenclamide		
Gliclazide	2.61(2.49,2.73)	0.83(0.51,0.96)
Hydrochlorothiazide		0.52(0.43,0.64)
Ibuprofen		13.51(12.72,14.27)
Ketoconazole	6.62(6.30,6.89)	
Lisinopril		7.08(6.17,7.37)
Loratadine	22.37(21.19,25.49)	15.31(9.32,18.10)

Losartan	37.55(34.19,38.89)	32.45(31.29,33.97)
Lovastatin		33.79(20.95,37.03)
Metformin	20.44(19.09,21.95)	8.53(3.03,9.40)
Metronidazole		0.86(0.76,1.07)
Miconazole Nitrate	7.89(7.28,8.49)	5.22(4.85,6.60)
Nifedipine Retard	9.15(8.64,29.85)	4.48(4.10,4.85)
Ofloxacin		
Omeprazole	67.90(60.22,70.01)	3.41(2.24,4.65)
Paracetamol		5.89(5.59,6.98)
Phenytoin		0.28(0.24,0.38)
Ranitidine		0.66(0.62,0.78)
Rifampicin		0.09(0.08,0.10)
Salbutamol inhaler	2.23(2.11,2.28)	0.56(0.47,0.75)
Simvastatin	9.28(8.51,9.59)	5.08(3.59,6.73)
Sodium Valproate		0.26(0.25,0.27)
Ceftazidime injection		0.17(0.11,0.24)
Isosorbide mononitrate	0.64(0.63,0.65)	2.10(1.54,2.22)