

*Medicine prices, availability and
affordability survey in Shaanxi Province, Western China*
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Report of a survey conducted September 1, 2010 to October 31, 2010

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Abbreviations

Cap	capsule
GDP	Gross domestic product
HAI	Health Action International
OB	Originator brand
Inh	Inhaler
Inj	Injection
LPG	Lowest priced generic equivalent
MPR	Median price ratio
MSH	Management Sciences for Health
EML	Essential Medicines List
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 Western China in September 2010 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 six regions: Xi'an, Yulin, Xianyang, Baoji, Shangluo, and Weinan. Patient price and availability data for 47 medicines was collected in 50 public and 36 private sector medicine outlets, selected using a validated sampling frame. Data was also collected on government procurement prices in the public sector outlets surveyed. For each medicine in the survey, data was collected for the originator brand (identified centrally) 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 Drug Price Indicator Guide for 2009 (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 work in order 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 8.9% and 26.6%, respectively, indicating that many patients must purchase medicines in the private sector. In this sector, the mean availability of originator brand and generic medicines was 18.0% and 43.6%, respectively.

Public sector procurement prices:

- In the public sector, the procurement agency is purchasing originator brands at prices significantly higher than international reference prices, indicating a poor level of purchasing efficiency. While overall lowest priced generics were purchased at efficient prices, some individual generic products were high priced.

Public sector patient prices:

- Final patient prices for generic medicines in the public sector are about 0.97 times their international reference prices.
- Public sector patient prices for generic medicines are 30.4% more than those for public procurement, indicating high mark-ups in the public sector distribution chain.

Private sector patient prices:

- Final patient prices for originator brands and lowest priced generics in the private sector are about 8.36 and 1.53 times their international reference prices, respectively.

- When originator brand medicines are prescribed/dispensed in the private sector, patients pay about 390.74% more than they would for generics.
- Generic medicines were priced 17.3% higher in the private sector than in the public sector.

Affordability of standard treatment regimens:

- In treating common conditions using standard regimens, the lowest paid government worker would need between 0.1 (hypertension) and 6.6 (hypertension) days' wages to purchase lowest priced generic medicines from the private sector. If originator brands are prescribed/dispensed, costs escalate to between 1.2 and 15.6 days' wages, respectively. Some treatments were clearly unaffordable, e.g. the treatment of ulcer with originator brand omeprazole would cost 15.6 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 price, availability and affordability of medicines in China:

- An extended survey should be conducted at provincial, county and village levels and more survey 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 should further implement the Essential Medicines Policy to reduce the price 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 generic prescription. 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 September 2010, the Department of Pharmacy Administration, Faculty of Pharmacy, School of Medicine, Xi'an Jiaotong University conducted a study on the prices, availability, affordability 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 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?
- 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. In 2009, the total population is 1,328,020,000, with 45.68% of population living in urban areas.

China is a middle income country with a GDP of US \$ 3,329 per capita. About 16.6% of the population live on less than US \$1/day, and 46.7% live on less than US \$2/day. Of the total labor force, approximately 4% of persons are unemployed.

Life expectancy at birth is 73 years, with 10.8 % of the population over the age of 60 years. In 2008, the mortality is 7.06% and the morbidity is 17.0% in two weeks.

Shaanxi province is located in the western part of China with a population of nearly 37.62 million people. Shaanxi Province has 11 cities with Xi'an as the capital. There are 80 counties (districts) and 1581 towns in Shaanxi. In 2008, the GDP per capital was 18143 RMB Yuan (2661USD). In the same year the average life expectancy was 75.62 years old. The infant mortality rate, in continuous decline, was 9.1 per 1000 live births. Because of the high life expectancy and low infant mortality rate, the ageing population

has become a problem in Shaanxi. According to the 2008 population statistics report, 8.97% of residents were over 65 years old.

Shaanxi is one of the cities in China where a bulk purchasing policy for drugs is implemented. From 2009, all of pharmaceuticals purchased by primary hospitals were procured through bulk purchasing.

Shaanxi is implementing the central procurement and distribution of essential medicines in provincial level and trying to apply zero price mark-up for the sales of essential drugs in both pharmacies and hospitals initiated in 2009. That is happening in 30% primary healthcare center in 2010. All of the primary healthcare sectors will implement zero price markup in 2012. The private sector should carry out this policy in 2012.

Over the past two decades, China's pharmaceutical market has greatly been developed. It has officially about 4,700 pharmaceutical manufacturers, 13,000 wholesalers and 360,000 retailers, producing and selling more than ten thousand western and traditional Chinese medicines in 2009.

Two surveys have been conducted in China: one in east area, Shandong Province, and one in southeast area, Shanghai.

Health sector

In 2009, the Chinese national healthcare expenditures were 1611.88 billion yuan, or 4.96% of the gross domestic product(GDP), of which 44% of the expenditure was on pharmaceuticals. The proportion was one of the highest shares of pharmaceutical expenditure in total health expenditure in the world, compared to an average of around 15% in the OECD countries. The average per capita medical expenditure for outpatient care in general hospital was 154.0 yuan in 2009, of which 78.1 yuan or 50.7% was drug expenditure

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 90% of the population has health coverage through universal health coverage. The public health sector is complemented by private clinics, hospitals, which represent approximately 50% of total health services.

Pharmaceutical sector

There are approximately 360,000 of licensed private retail medicine outlets in the country. Sectors which dispense a substantial proportion of medicines to patients include the public sector, the private sector, and the other sector.

National Medicines (Drugs) Policy

In China, a National Medicines Policy (NMP) document exists in official form. It was last updated in 2009. 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 195,424 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, are 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 no incentives to dispense generic medicines at public or private pharmacies.

There are provisions in the medicines regulations covering promotion and 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.
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 2009, the total public expenditure for medicines was US\$ 104 billion. Approximately 19.5% by value, are imported.

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.

China has a policy covering medicine prices that applies to the public sector, the private sector, and non-governmental organizations. It includes policies 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 committee responsible for the selection of products on the national EML.

The Ministry of Health does not produce national, hospital or primary care standard treatment guidelines (STG) for major conditions.

Antibiotics are occasionally sold over the counter without a prescription, while injections are never 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 47 medicines were surveyed – 27 from the WHO/HAI core list (12 global medicines and 15 regional medicines), and 20 supplementary medicines selected at the country level. 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 September 1st 2010, the first day of data collection, i.e. 1 USD = 6.8188 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.

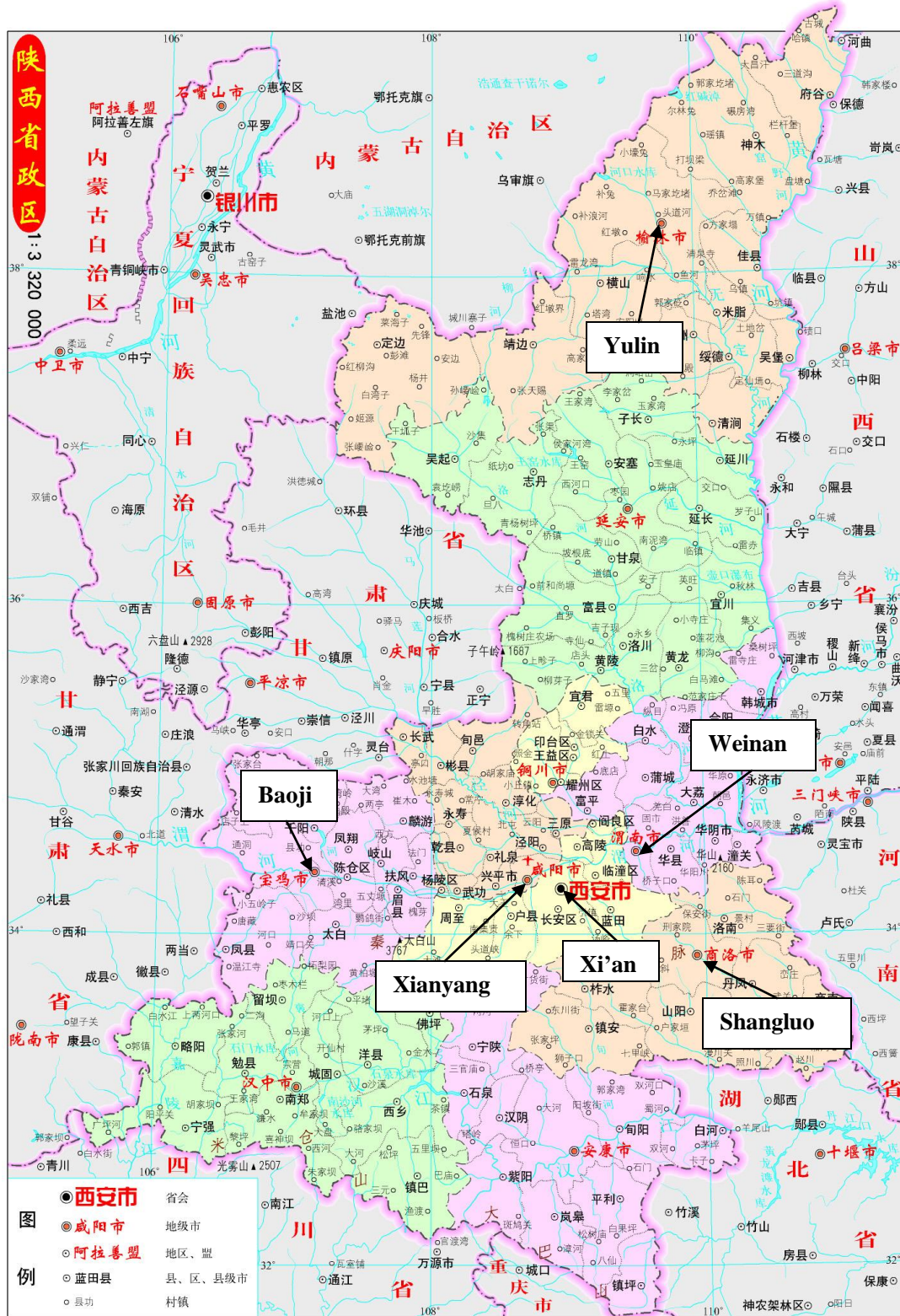
In the first step, six regions were selected as "survey areas" for data collection. The major urban centre of Xi'an was selected as one survey area, and an additional five areas were chosen at random from those which could be reached within a one day's drive from Xi'an. This resulted in the following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

1. Xi'an (major urban centre)
2. Yulin

¹ The WHO/HAI sampling methodology was validated in 2005 when a medicine prices survey was 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.

3. Xianyang
4. Baoji
5. Shangluo
6. Weinan

Figure 1. Geographic location of the six 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 four 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, 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 five public medicine outlets in each of the six survey areas, for a total of 30 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 30 private outlets. Back-up facilities were selected in case the availability of the survey medicines was poor (see page 20).

Table 1. Sample of public and private medicine outlets

	Xi'an	Yulin	Xianyang	Baoji	Shangluo	Weinan
Public sector	-1 tertiary hospital -2 secondary hospitals -2 primary care centres	-1 tertiary hospital -2 secondary hospitals -2 primary care centres	-1 tertiary hospital -2 secondary hospitals -2 primary care centres	-1 tertiary hospital -2 secondary hospitals -2 primary care centres	-1 tertiary hospital -2 secondary hospitals -2 primary care centres	-1 tertiary hospital -2 secondary hospitals -2 primary care centres
Private sector	-5 pharmacies nearest to the selected public hospital	-5 pharmacies nearest to the selected public hospital	-5 pharmacies nearest to the selected public hospital	-5 pharmacies nearest to the selected public hospital	-5 pharmacies nearest to the selected public hospital	-5 pharmacies nearest to the selected public hospital

Selection of medicines to be surveyed

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 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 are not available in China.

An additional 20 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. Of the 47 medicines surveyed, 33 were on the EML for China.

Data Collection

The survey team consisted of a survey manager, 6 area supervisors, 12 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 August 1, 2010 to August 5, 2010. 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 September 1st 2010 and September 30th 2010. 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, an additional outlet was surveyed. This increased the total sample to 50 public sector medicine outlets and 36 private sector medicine outlets (86 in total).

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 a recent procurement order from the centralized medicine procurement agency. Procurement prices were entered in the workbook on the medicines found (originator brands and lowest priced generics) in each public sector outlet sampled.

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.

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.

As an external benchmark, and 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. The exchange rate used to calculate MPRs was 1 US\$ = 6.8188 Yuan; this was the commercial “buy” rate on the first day of data collection taken from Oanda FX-History. The source of the reference prices was the 2009 Management Sciences for Health (MSH) International Drug Price Indicator Guide. These 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 (25.3333 Yuan/day and amount 3.7152 USD/day at the time of the survey from the Department of Human Resources and Social Security of Shaanxi Province). 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 = 50 outlets)				Private sector (n = 36 outlets)	
	All medicines (n = 47 medicines)		EML medicines only (n = 33 medicines)		All medicines (n = 47 medicines)	
	Originator brand	Lowest price generic	Originator brand	Lowest price generic	Originator brand	Lowest price generic
Mean availability (standard deviation)	8.9% (16.02%)	26.6% (28.1%)	5.8% (16.6%)	30.4% (29.4%)	18.0% (29.0%)	43.6% (33.0%)

- Average availability of all surveyed originator brand medicines in the public sector was low at 8.9%. When analysis is limited to survey medicines listed on the national EML, public sector availability decreases at 5.8%.
- In the public sector, generics were the predominant product type available but availability was still low, even for medicines on the EML (30.4%).
- Average availability for originator brands in the private sector was low at 18%. Generics were the predominant product type available but their availability was still less than 50% .
- In the private sector, medicine availability was generally higher than in the public sector.

Annex 3 contains the availability of individual medicines in both the public and private sectors. In the public sector, six medicines were not found in any outlets (either as originator brand or generics); acyclovir, atenolol, ciprofloxacin, glibenclamide, ibuprofen, and ofloxacin. A further 6 medicines (cefradine, diazepam, fluoxetine , erythromycin, fluconazole, lisinopril), were found in 10% or less of the 50 facilities surveyed. In the private sector, atenolol and diazepam were not found in any of the 36 pharmacies surveyed (either product type) and 4 medicines (erythromycin, glibenclamide, ibuprofen, ofloxacin), were found in 10% or less of the pharmacies.

Table 3: Availability of medicines in the public sector

Availability	Originator brand	Lowest price generic
Medicines not found in any outlets	Aciclovir, , Amitriptyline, Amoxicillin, Atenolol, Captopril, Carbamazepine, Cefradine injection, Cephalexin, Cimetidine Ciprofloxacin, Co-trimoxazole, Diazepam, Diclofenac, Digoxin Enalapril, Erythromycin, Fluconazole, Glibenclamide,Hydrochlorothiazide, Ibuprofen, Lisinopril, Lovastatin,	Aciclovir, Atenolol, Beclometasone inhaler, Ciprofloxacin, Glibenclamide, Ibuprofen, Ketoconazole, Ofloxacin

	Metronidazole, Nifedipine Retard, Ofloxacin, Paracetamol, Phenytoin, Ranitidine, Rifampicin, Sodium Valproate	
Medicines found in 1 - 25% of outlets	Azithromycin, Beclometasone inhaler, Ceftriaxone injection, Fluoxetine, Loratadine, Losartan, Metformin, Omeprazole, Simvastatin	Albendazole, Amitriptyline , Amlodipine, Amoxicillin, Atorvastatin , Cefradine injection, Cephalexin, Diazepam, Diclofenac, Erythromycin, Fluconazole, Fluoxetine, Lisinopril, Loratadine, Lovastatin, Metformin, Miconazole Nitrate cream, Paracetamol, Salbutamol inhaler, Simvastatin
Medicines found in 26 -50% of outlets	Albendazole, Amlodipine, Atorvastatin, Gliclazide, Ketoconazole, Salbutamol inhaler	Carbamazepine, Cimetidine, Gliclazide, Nifedipine Retard, Phenytoin, Ranitidine, Rifampicin, Sodium Valproate
Medicines found in 51 - 75% of outlets	NONE	Azithromycin, Co-trimoxazole, Digoxin, Enalapril, Hydrochlorothiazide
Medicines found in more than 75% of outlets	Miconazole Nitrate cream	Aminophylline, Captopril, Ceftriaxone injection, Metronidazole, Omeprazole

Tab/cap unless otherwise stated

Table 4: Availability of medicines in the private sector

	Originator brand	Lowest price generic
Medicines not found in any outlets	Aciclovir, Amitriptyline, Atenolol, Captopril, Carbamazepine, Cefradine injection, Cephalexin, Cimetidine, Ciprofloxacin, Co-trimoxazole, Diazepam, Diclofenac, Enalapril, Erythromycin, Glibenclamide, Hydrochlorothiazide, Ibuprofen, Lovastatin, Metronidazole, Ofloxacin, Phenytoin, Ranitidine, Rifampicin	Atenolol, Beclometasone inhaler, Diazepam, Ketoconazole
Medicines found in 1- 25% of outlets	Amoxicillin, Azithromycin, Beclometasone inhaler, Ceftriaxone injection, Digoxin, Fluconazole, Fluoxetine, Lisinopril, Nifedipine Retard, Paracetamol, Sodium Valproate	Albendazole, Amitriptyline, Atorvastatin, Cefradine injection, Ciprofloxacin, Erythromycin, Fluconazole, Fluoxetine, Glibenclamide, Ibuprofen, Lisinopril , Losartan, Miconazole Nitrate cream, Ofloxacin, Paracetamol,
Medicines found in 26 - 50% of outlets	Losartan, Metformin, Omeprazole, Salbutamol inhaler, Simvastatin	Aciclovir, Amlodipine, Cephalexin, Diclofenac, Loratadine, Lovastatin, Metformin, Phenytoin, Simvastatin

Medicines found in 51 - 75% of outlets	Amlodipine, Atorvastatin, Gliclazide, Ketoconazole	Aminophylline, Carbamazepine, Ceftriaxone injection, Digoxin, Gliclazide, Nifedipine Retard, Salbutamol inhaler, Sodium Valproate
Medicines found in more than 75% of outlets	Albendazole, Loratadine, Miconazole Nitrate cream	Amoxicillin, Azithromycin, Captopril, Cimetidine, Co-trimoxazole, Enalapril, Hydrochlorothiazide, Metronidazole, Omeprazole, Ranitidine, Rifampicin

Tab/cap unless otherwise stated

2. Public sector prices

2.1 Public sector procurement prices

Table 5. Public sector procurement - 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 = 15 medicines)	8.49	3.96	21.89
Lowest price generic (n = 28 medicines)	0.75	0.43	3.74

Of the 47 medicines included in the survey, procurement prices were analysed for 15 originator brand and 28 generics (products found in 4 or more public sector facilities). Overall the public sector is procuring generics at 0.75 times their international reference prices, and originator brands at 8.49 times their international reference prices. Thus, overall the government procurement agency is purchasing efficiently for generics (although some individual generics were high priced), but paying very high prices for originator brands. The interquartile range shows substantial variation in median price ratios across individual medicines.

For 8 medicines procurement prices were obtained for both product types. Originator brands were found to be about 6 times the price of the lowest priced generics.

Table 6. Some individual medicines with high procurement prices (originators and/or lowest priced generics) and/or where the difference between the originator brand and lowest priced generic equivalent is large

Medicine	MPR originator brand (OB)	MPR lowest priced generic (LPG)	Ratio OB/LPG
Amlodipine	25.61	5.16	5.0
Ceftriaxone	17.41	0.42	41.4
Diclofenac		21.87	
Enalapril		7.83	
Fluoxetine	108.39		

Gliclazide	11.43	4.38	2.6
Loratadine	27.25	5.68	4.8
Metformin	18.17		
Miconazole nitrate cream	8.49		
Omeprazole	56.59	1.68	33.7
Salbutamol inhaler	2.27	0.33	6.9
Simvastatin	6.86	3.17	2.2

Annex 4 contains public procurement prices for individual medicines (when found in a least 1 outlet). All originator brand for which the government is paying several times the international reference price. Generic for which the government is paying more than 5 times the international reference price include Amlodipine (5.16), Diclofenac (21.87), Enalapril (7.83), Erythromycin (12.36), Fluconazole(9.19), Fluoxetine (34.95), Loratadine (5.68), Metformin (6.70) and Paracetamol (5.63).

2.2 Public sector patient prices

Table 7. 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 = 15 medicines)	10.16	4.57	25.18
Lowest price generic (n = 28 medicines)	0.97	0.58	4.28

The results above show that in the public sector:

- Overall, originator brand medicines are sold to patients at 10.16 times their international reference price. Half of the originator brand medicines were priced at 4.57 to 25.18 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 0.97 times their international reference price. Half of the lowest priced generic medicines were priced at 0.58 to 4.28 times their international reference price; there is 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 (i.e. very high priced) include amlodipine (MPR = 29.46), ceftriaxone injection (MPR = 20.01), fluoxetine (MPR = 124.67), loratadine (MPR = 31.25), metformin (MPR = 20.89), omeprazole (MPR = 65.06). 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 several times higher than international reference prices include amlodipine (MPR = 7.01), diclofenac

(MPR = 25.34), enalapril (MPR = 8.99), gliclazide (MPR=5.04), loratadine (MPR=8.68), lovastatin (MPR=5.53). The 25th and 75th percentiles for individual medicines show that, for generic medicines, prices vary significantly between public sector medicine outlets.

Table 8. Some individual medicines with high patient prices (originators and/or lowest priced generics) and/or where the difference between the originator brand and lowest priced generic equivalent is large

Medicine	MPR originator brand (OB)	MPR lowest priced generic (LPG)	Ratio OB/LPG
Albendazole	5.80	1.56	3.7
Amlodipine	29.46	7.01	4.2
Ceftriaxone	20.01	0.59	33.9
Diclofenac		25.34	
Enalapril		8.99	
Fluoxetine	124.67		
Gliclazide	13.15	5.04	2.6
Loratadine	31.25	8.68	3.6
Metformin	20.89		
Miconazole nitrate cream	9.80		
Omeprazole	65.06	2.12	30.7
Salbutamol inhaler	2.62	0.42	6.2
Simvastatin	10.16	4.09	2.5

In the table below, only those medicines for which both the originator brand and the lowest priced generically equivalent product were found were included in the analysis to allow for the comparison of prices between the two product types. Results show that in the public sector, originator brands cost 435% more than their generic equivalents.

Table 9. Comparison of the prices of originator brands and generically equivalent products

Type (n = 8 medicines)	Median MPR	25 %percentile	75 %percentile
Originator brand	16.58	9.07	29.91
Lowest price generic	3.10	1.32	5.53

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

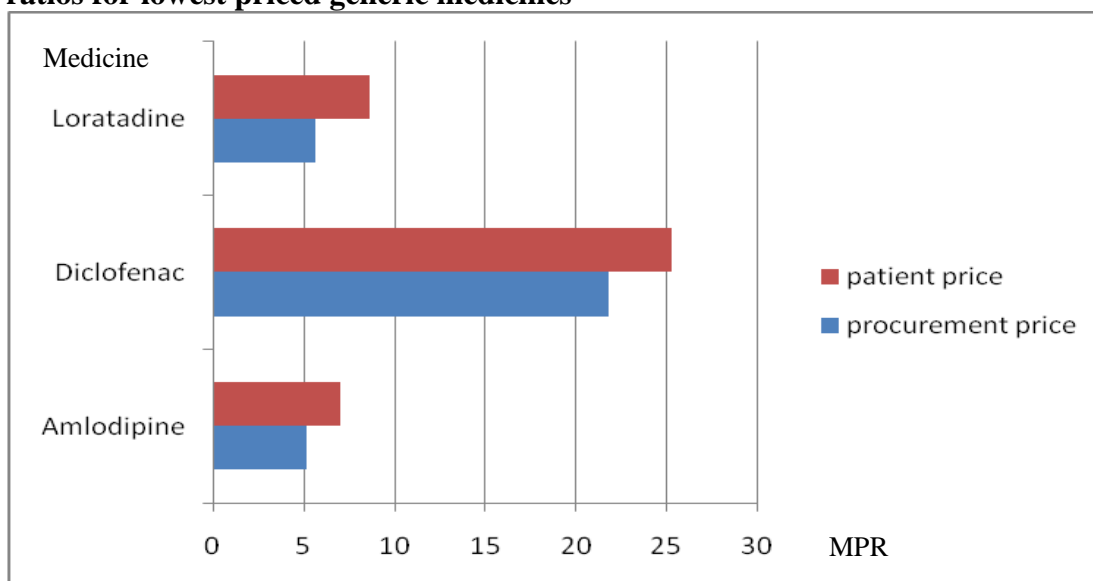
Table 10. Median MPRs for public procurement prices and public sector patient prices

Product type	Median MPR Public Procurement	Median MPR Public Patient Prices	% difference patient prices to procurement
Originator brand (n = 15 medicines)	8.49	10.16	19.6

Lowest price generic (n = 28 medicines)	0.75	0.97	30.4
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In the above table, only those medicines found in public procurement orders and public sector medicine outlets were included in the analysis to allow for the comparison of purchase price to final patient price. Results show that final patient prices in the public sector are 19.6% and 30.4% 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 11. 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 %percentile	75 %percentile
Originator brand (n = 15 medicines)	8.36	4.31	24.89
Lowest price generic (n = 37 medicines)	1.53	0.52	4.65

The results above show that in the private sector:

- Originator brand medicines are generally sold at 8.36 times their international reference price. Half of the originator brand medicines were priced at 4.31 to 24.89 times their international reference price; there is therefore substantial variation in MPRs across individual originator brand medicines in the private sector.

- Lowest price generic medicines are generally sold at 1.53 times their international reference price. Half of the lowest priced generic medicines were priced at 0.52 to 4.65 times their international reference price; there is therefore substantial variation in MPRs across individual generic medicines in the private sector.

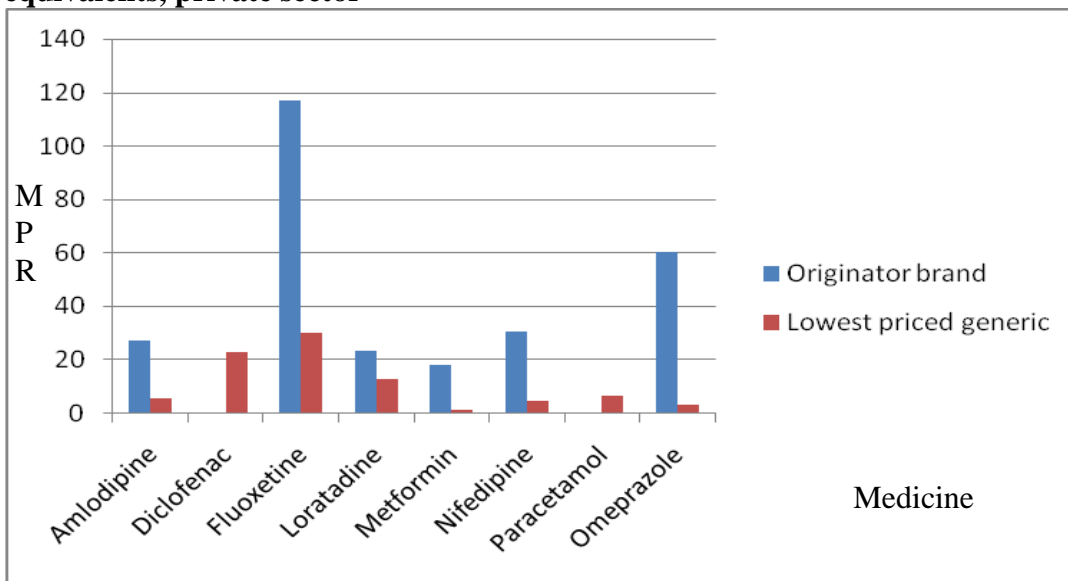
Annex 6 contains the median price ratios for individual medicines found in the private sector. Originator brand medicines priced more than 20 times higher than international reference prices include amlodipine (MPR = 26.81), fluoxetine (MPR=116.77), loratadine (MPR=22.97), nifedipine redard (MPR=30.15), omeprazole (MPR=60.18). 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 several times higher than international reference prices include amlodipine (MPR = 5.48), diclofenac (MPR=22.51), enalapril (MPR=11.30), fluoxetine (MPR=29.62), loratadine (MPR=12.59), lovastatin (MPR=5.72), miconazole nitrate (MPR=6.26), paracetamol (MPR=6.11). The 25th and 75th percentiles for individual medicines show that, for generic medicines, prices vary significantly between private sector medicine outlets.

Table 12. Comparison of the prices of originator brands and generically equivalent products: Median MPRs for medicines found as both product types

Type (n = 11 medicines)	Median MPR	25 %percentile	75 %percentile
Originator brand	18.01	8.33	28.48
Lowest price generic	3.67	2.83	5.87

In the above table, 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 show that in the private sector, originator brands cost 391% more, on average, than their generic equivalents. Thus, patients are paying substantially more to purchase originator brand medicines when lower-cost generics are not available.

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 13. 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 = 14 medicines)	9.98	8.83	-16.5%
Lowest price generic (n = 27 medicines)	0.83	0.98	17.3%

In the above table, 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 show that final patient prices in the private sector are -16.5% and 17.3% higher than in the public sector for originator brands and generic equivalents, respectively.

5. Regional analysis

5.1 Comparison of prices and availability in the public sector across the six regions surveyed

As shown in the table below, overall prices for originator brands in the public sector differed across the six regions from a median MPR of 6.19 in Baoji to about three times that price in Xián (medMPR19.63). Prices for lowest priced generics showed less variation across the regions. Generics prices were lowest in Yulin (medMPR 0.6) and highest in Xianyang (medMPR 1.02). While originator brands were high priced compared to international reference priced, lowest priced generics were at or below the reference prices. However, due to the small sample size in each region (5 medicine outlets per sector, based on availability of the medicine in at least 4 of the 5), results should be interpreted with caution.

Table 14: Median MPRs per survey area, public sector (5 medicine outlets per survey area)

	Xi'an	Yulin	Xianyang	Baoji	Shangluo	Weinan
Median MPR Originator brand	19.63	8.64	6.59	6.19	9.77	10.70
Median MPR Lowest price generic	0.90	0.60	1.02	0.66	0.78	0.92

The mean availability of generics medicines in the public sector ranged from 21.7% in Shangluo to 30.9% in Yulin. For originator brands, mean availability was highest in Weinan (11.1%) and lowest in Shangluo (3.9%).

Table 15: Mean availability per survey area, public sector (5 medicine outlets per survey area)

	Mean availability					
	Xi'an	Yulin	Xianyang	Baoji	Shangluo	Weinan
Originator brand	9.8%	10.6%	10.6%	8.2%	3.9%	11.1%
Lowest price generic	29.8%	30.9%	26.6%	26.0%	21.7%	24.5%

5.2 Comparison of prices and availability in the private sector across the six regions surveyed

As shown in the table below, the median MPR for generics in the private sector did not differ significantly across the six regions surveyed. Overall, medicine prices were lowest in Weinan. Median MPRs for originator brands ranged from 6.76 in Weinan to 9.65 in Yulin. Median MPRs for lowest price generics ranged from 0.65 in Weinan to 0.92 in Baoji. However, due to the small sample size in each region (5 medicine outlets per sector, based on availability of the medicine in at least 4 of the 5), results should be interpreted with caution.

Table 16: Median MPRs per survey area, private sector (5 medicine outlets per survey area)

	Xi'an	Yulin	Xianyang	Baoji	Shangluo	Weinan
Median MPR Originator brand	7.12	9.65	7.56	8.21	7.87	6.76
Median MPR Lowest price generic	0.81	0.69	0.86	0.92	0.66	0.65

The mean availability of survey medicines in the private sector ranged from 33.8% in Yulin to 56.6% in Baoji and Weinan for generic equivalents. For originator brands, mean availability was lowest in Shangluo (14.2%) and highest in Weinan (25.1%).

Table 17: Mean availability per survey area, private sector (5 medicine outlets per survey area)

	Mean availability					
	Xi'an	Yulin	Xianyang	Baoji	Shangluo	Weinan
Originator brand	16.5%	17.4%	20.0%	16.1%	14.5%	25.7%
Lowest price generic	38.3%	33.8%	49.8%	56.6%	35.8%	56.6%

6. Affordability of standard treatment regimens

The affordability of treatment for 22 common conditions 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, 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 25.3333 Yuan.

Table 18. 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	1.3	0.2	1.2	0.2
Diabetes	Metformin 500mg cap/tab	1 cap/tab x 3 x 30 days = 90	5.7		4.9	0.3
Hypertension	Amlodipine 5 mg cap/tab	1 cap/tab x 30 days = 30	7.0	1.7	6.3	1.3
Hypertension	Captopril 25 mg cap/tab	1 cap/tab x 2 x 30 days = 60		0.1		0.1
Hypercholesterolemia	Simvastatin 20 mg cap/tab	1 cap/tab x 30 days = 30	5.4	2.2	4.5	1.9
Depression	Amitriptyline 25 mg cap/tab	1 cap/tab x 3 for 30 days = 90		0.6		0.7
Adult respiratory infection	Ciprofloxacin 500 mg cap/tab	1 cap/tab x 2 for 7 days = 14				0.1
Adult respiratory infection	Co-trimoxazole 80+400mg cap/tab	1 cap/tab x 2 for 7 days = 14		<0.1		<0.1
Adult respiratory infection	Amoxicillin 500mg cap/tab	1 cap/tab x 3 for 7 days = 21		0.7		0.4
Adult respiratory infection	Ceftriaxone 1 g/vial injection	1 vial	3.7	0.1		0.1
Diabetes	Gliclazide 80mg cap/tab	1 cap/tab x 30 days = 30	1.6	0.6	1.3	0.5
Arthritis	Diclofenac 50mg cap/tab	1 cap/tab x 2 x 30 days = 60		2.3		2.1
Ulcer	Omeprazole 20mg cap/tab	1 cap/tab x 30 days = 30	16.9	0.6	15.6	0.8
Hypercholesterolemia	Atorvastatin 20mg cap/tab	1 cap/tab x 30 days = 30	12.5		11.0	
Epilepsy	Carbamazepine 100mg cap/tab	1 cap/tab x 2 x 30 days = 60		0.1		0.1
Asthma	Beclometasone inhaler 50mcg/dose	1 inhaler of 200 doses	1.9		1.8	
Depression	Fluoxetine	1 cap/tab x 30	12.3		11.5	2.9

	20mg cap/tab	days = 30				
Hypertension	Lisinopril 10mg cap/tab	1 cap/tab x 2 x 30 days = 60				5.0
Hypertension	Losartan 50mg cap/tab	1 cap/tab x 30 days = 30	8.6		7.5	6.6
Hypertension	Nifedipine Retard 20mg cap/tab	1 cap/tab x 2 x 30 days = 60		1.5	10.0	1.4
Ulcer	Ranitidine 150mg cap/tab	1 cap/tab x 2 x 30 days = 60		0.2		0.2
Viral infection	Aciclovir 200mg cap/tab	1 cap/tab x 5 x 5 days = 25				0.4

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 (1.7 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.5 days' wages), Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (2.2 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (2.3 days' wages) .

In the private sector, the affordability of lowest price generics 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 Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (1.9 days' wages), Hypertension Amlodipine 5 mg cap/tab 1 cap/tab x 30 days (1.3 days' wages), Depression Fluoxetine 20mg cap/tab 1 cap/tab x 30 days (2.9 days' wages), Hypertension Lisinopril 10mg cap/tab 1 cap/tab x 2 x 30 days (5.0 days' wages), Hypertension Losartan 1 cap/tab x 30 days (6.6 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.4 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (2.1 days' wages). The most affordable standard treatments were generally those for treating acute conditions like Adult respiratory infection (0.1 – 0.4 days' wages).

When originator brand medicines are prescribed and dispensed in the private sector, several treatments cost many days' wage. For example, treating Ulcer with Omeprazole 20mg cap/tab 1 cap/tab x 30 days = 30 costs 15.6 of days' wages, while treating Depression with Fluoxetine 20 mg cap/tab 1 cap/tab x 30 days costs 11.5 of 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, medicine costs are 0.8 days' wages in the public sector and 1.0 days' wages in the private sector if the lowest price generics are purchased.

If originator brands are purchased, treatment costs are 18.2 days' wages in public sector and 16.8 days in the private sector.

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

	Public sector		Private sector Originator brand - private sector	
	Originator brand	Lowest priced generic	Originator brand	Lowest priced generic
Father - omeprazole	16.9	0.6	15.6	0.8
Child – salbutamol inhaler	1.3	0.2	1.2	0.2
Total days' wages for one month treatment	18.2	0.8	16.8	1.0

6. International comparisons

In every WHO/HAI survey, data is collected on the same core 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 (China 2010, Brazil, Rio Grand do Sol Province 2008, India, Maharashtra State 2005, South Africa, Gauteng Province 2004, and Mongolia 2004), 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/>). Data was not adjusted for inflation/deflation and purchasing power parity .. Given the wide variation in the public health systems of different countries, results are presented mostly for the private for-profit sector.

6.1 International comparisons of public sector procurement prices

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

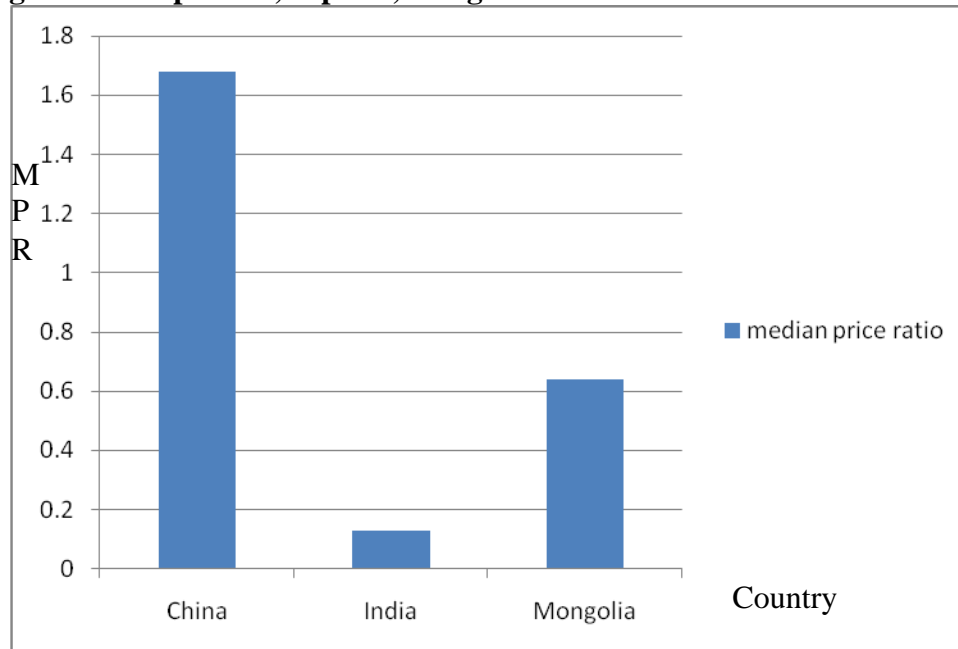
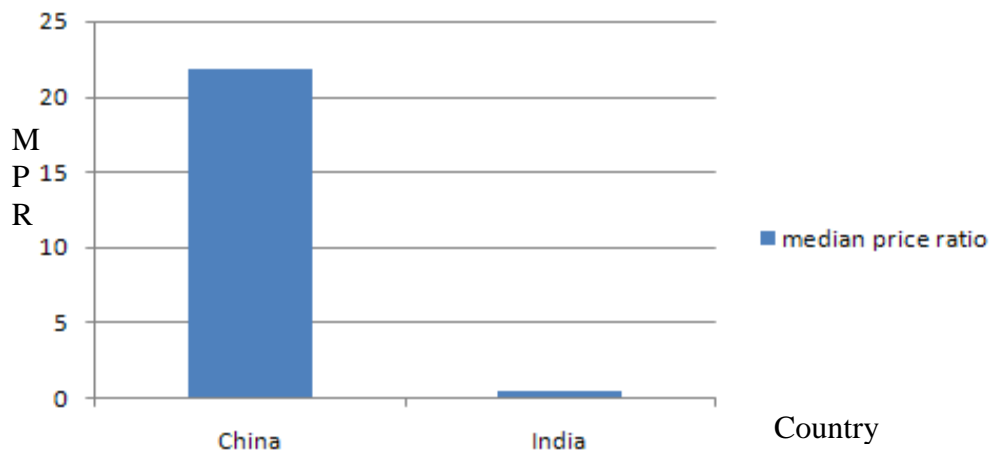


Figure 5. Ratio of local price to international reference price for lowest priced generic diclofenac, cap/tab, 50mg in 2 countries



Results for these medicines show that government procurement prices in China are higher than those in India and Mongolia. Overall, Chinese public sector appears to be purchasing these medicines less efficiently than other countries.

6.2 International comparisons of private sector prices

Figure 6. Ratio of local price to international reference price for omeprazole, cap/tab, 20mg in 5 countries

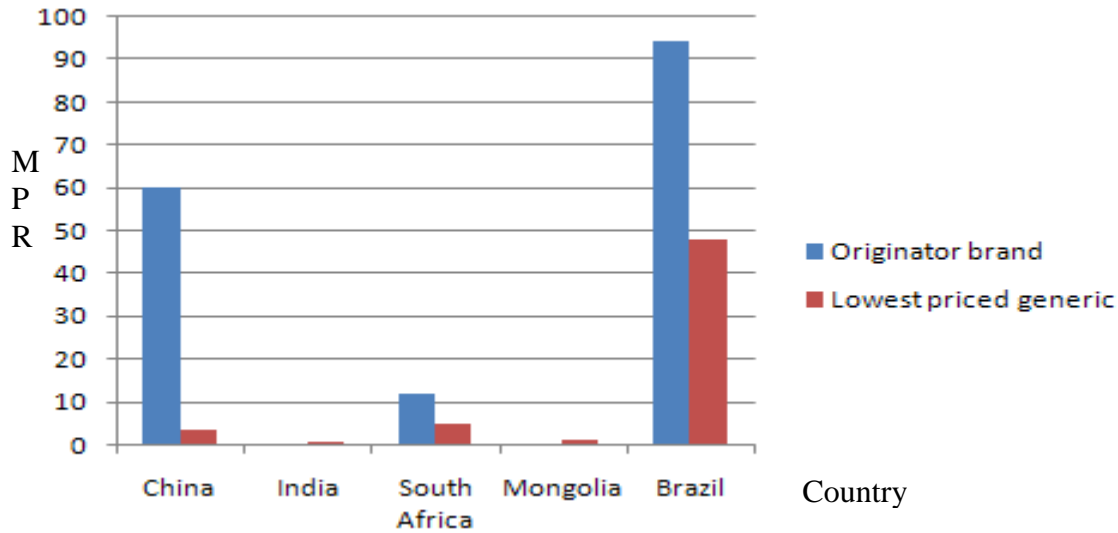
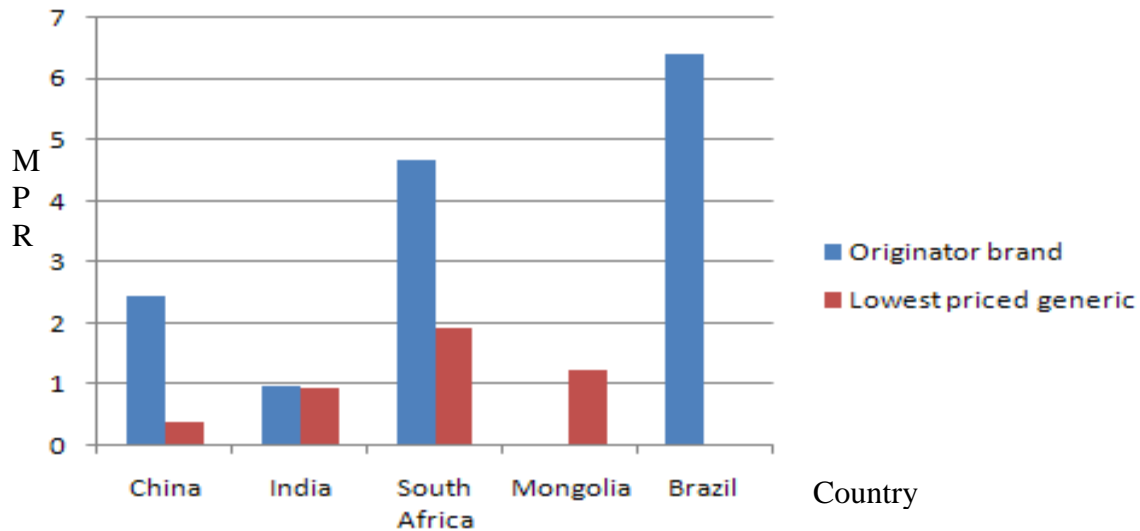


Figure 7. Ratio of local price to international reference price for Salbutamol, inhaler, 100 mcg/dose in 5 countries



Results for individual originator brands show that prices in China are lower than the identical product in Brazil, and higher than those in India. With respect to lowest priced generic medicines, Chinese prices are generally similar to those in the other countries except Brazil..

7.3 International comparisons of private sector availability

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

Survey	Median availability (%)	
	Originator brand	Lowest priced generic
China	36.1	86.1
Brazil	46,7	86.7
India	0	91.7
South Africa	83.3	50
Mongolia	0	80

Results for individual medicines show that the availability of originator brand omeprazole in China is lower than in South Africa and Brazil, but higher than in India and Mongolia where it was not found in any of the pharmacies surveyed. With respect to generic medicines, availability in China is similar to Mongolia, Brazil and India, but higher than in South Africa..

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

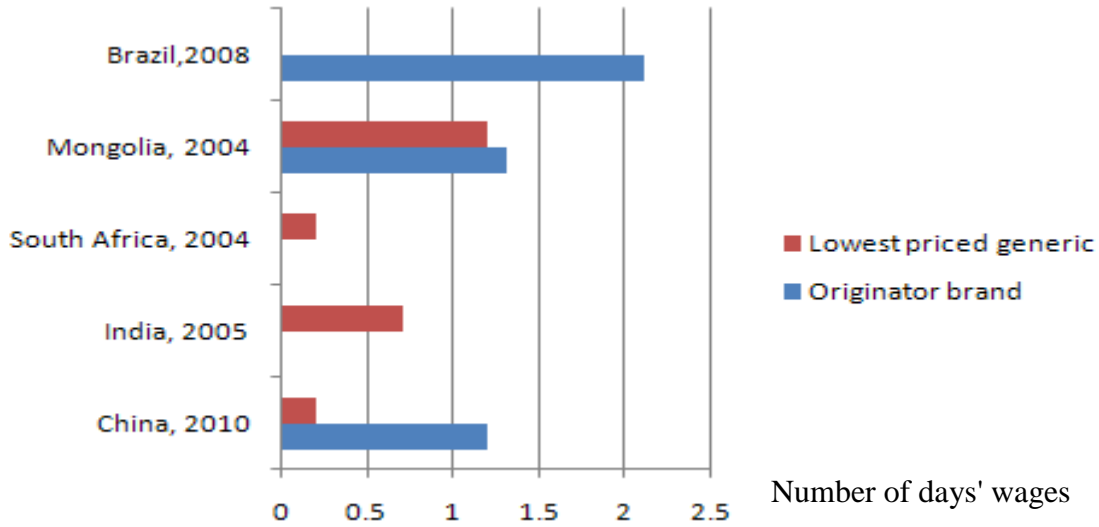
Survey	Median availability (%)	
	Originator brand	Lowest priced generic
China	30.6	61.1
Brazil	86.7	0
India	31.3	72.9
South Africa	83.3	96.7
Mongolia	4.0	60

The availability of originator brand salbutamol inhaler in China was similar to India, higher than in Mongolia but lower than in South Africa and Brazil. With respect to generic medicines, availability in China is less than in South Africa and India.

Across these two medicines, the availability of generics (which are lower priced compared to originator brands) was lower in China than in India, and similar to Mongolia.

6.3 International comparisons of private sector affordability

Figure 8. 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



The above figure shows that in the selected countries, treatment of asthma using Salbutamol, inhaler, 0.1mg/dose 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 is more affordable than observed in most other countries. When the originator brand is purchased, the affordability ranges from 1.2 to 2.1 days' wages across the selected countries. In China, the lowest paid government worker would need to spend 1.2 days' wages to purchase the originator brand, which is more affordable than observed in most other countries.

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 47 medicines in China using an international standardized methodology. Results indicate that in the public sector, the procurement of originator brand medicines is inefficient, as shown by purchase prices higher than, international reference prices. By the time these medicines are sold to patients, prices have increased by more than 19.6% as a result of add-on costs in the public sector distribution chain. Prices of lowest priced generics are reasonable.

Availability of generic medicines in the public sector is poor. The average availability across all survey medicines was 26.5%, while the availability of medicines on the national EML was 30.2%.

- Generics with particularly low availability in the public sector include cefradine (4.0% availability), diazepam (4.0% availability), fluoxetine (4.0% availability), metformin (6.0% availability) and paracetamol (6.0% availability). In some cases significantly higher priced originator brands were available but less affordable. For example, metformin originator brand availability was higher at 18% (but still sub-optimal) but the price was about 3 times that of the lowest priced generic
- Given the low availability of medicines in the public sector, it can be concluded that many/most patients must purchase medicines from the private sector.
- Originator brand medicines are rarely available in the public sectors; 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 43.6% for lowest price generic medicines and 18.1% for originator brands.

- Generic medicines with particularly low availability in the private sector include erythromycin (2.8% availability), ibuprofen (2.8% availability), ofloxacin (8.3% availability).

Final patient prices for lowest price generic medicines in the public sector are reasonable. Lowest price generic medicines were priced at 0.97 times their international reference price, while originator brand medicines were very high priced at 10.16 times their international reference price. Compared with the public sector, private sector patient prices were, on average, -16.5% and 17.3% higher for originator brands and generic equivalents, respectively. Lowest price generic medicines were priced at 1.53 times their international reference price, while originator brand medicines were priced at 8.36 times their international reference price.

- These results show that patients are paying more for originator brand medicines in the public sector than in the private sector.

In the public sector, half of lowest price generic medicines were priced between 0.58 and 4.28 times their international reference price, while half of originator brand medicines were priced between 4.57 and 25.18 times their international reference price. In the

private sector, half of lowest price generic medicines were priced between 0.58 and 4.28 times their international reference price, while half of originator brand medicines were priced between 4.57 and 24.18 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 for either a course of treatment (acute conditions) or 30 days treatment (chronic conditions). However, low public sector availability obliges many patients to purchase medicines from the private sector. In the private sector, the majority of treatments cost less than 1 or 2 days wages of the lowest paid government worker when lowest price generics are used although some treatments cost more. The treatment of Hypercholesterolaemia Simvastatin 20 mg cap/tab 1 cap/tab x 30 days (1.9 days' wages), Hypertension Amlodipine 5 mg cap/tab 1 cap/tab x 30 days (1.3 days' wages), Depression Fluoxetine 20mg cap/tab 1 cap/tab x 30 days (2.9 days' wages), Hypertension Lisinopril 10mg cap/tab 1 cap/tab x 2 x 30 days (5.0 days' wages), Hypertension Losartan 1 cap/tab x 30 days (6.6 days' wages), Hypertension Nifedipine Retard 20mg cap/tab 1 cap/tab x 2 x 30 days (1.4 days' wages), Arthritis Diclofenac 50mg cap/tab 1 cap/tab x 2 x 30 days (2.1 days' wages) are clearly unaffordable even when lowest priced generics are used. If originator brands and prescribed and dispensed, the lowest paid government worker would need to spend between 1.2 (Asthma Salbutamol 1 inhaler of 200 doses) to 15.6 (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 16.6% 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 for some medicines at least, China has higher prices, and similar affordability, than 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 price, availability, 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 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 dependant 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.

Recommendations and conclusion

In Shaanxi Province, the availability of the surveyed medicines was extremely low in both the public and private sectors. In these sectors, considerable price differences were seen between originator brands and generics. In the public sector, originator brands were about 6 times more expensive than the lowest priced generic. In the private sector the difference was about 4 times. Generic medicines were cheaper and originator 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 at provincial, county and village levels and more survey should be conducted in many other provinces. In order to research the availability of essential

medicines, the list of medicines surveyed should include more from the Chinese Essential Medicines List 2009.

- 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, and low priced quality generics should be purchased for off-patent medicines rather than high priced originator brands
- 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 generic medicines (especially low priced generics) 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 is the first study about the price, availability and affordability of key medicines in western China. Two surveys have been conducted in China using the WHO/HAI methodology : one in east area, Shandong Province and one in southeast area, Shanghai. 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/tablet	Daonil/Sanofi-Aventis
	3	Hypertension	Atenolol	50 mg	cap/tablet	Tenormin/AstraZeneca
	4	Hypertension	Captopril	25 mg	cap/tablet	Capoten/BMS
	5	Hypercholesterolaemia	Simvastatin	20 mg	cap/tablet	Zocor/MSD
	6	Depression	Amitriptyline	25 mg	cap/tablet	Tryptizol/MSD
	7	Infectious disease	Ciprofloxacin	500 mg	cap/tablet	Ciproxin/Bayer
	8	Infectious disease	Amoxicillin	500 mg	cap/tablet	Amoxil/GSK
	9	Infectious disease	Ceftriaxone	1 g/vial	injection	Rocephin/Roche
	10	Anxiety	Diazepam	5 mg	cap/tablet	Valium/Roche
	11	Pain/inflammation	Diclofenac	50 mg	cap/tablet	Voltarol/Novartis
	12	Ulcer	Omeprazole	20 mg	cap/tablet	Losec/AstraZeneca
MRegional core list	13	Intestinal parasite	Albendazole	200mg	cap/tablet	Zentel/GSK
	14	Hypertension	Amlodipine	5mg	cap/tablet	Norvasc/Pfizer
	15	Hypercholesterolaemia	Atorvastatin	20mg	cap/tablet	Liptor/ Prizer
	16	Asthma	Beclometasone	50mcg/dose	inhaler	Becotide/GSK
	17	Infectious disease	Cephalexin	250mg	cap/tablet	Keflex/Eli Lilly
	18	Hypertension	Enalapril	10mg	cap/tablet	Renitec/MSD
	19	Depression	Fluoxetine	20mg	cap/tablet	Prozac/Eli Lilly
	20	Diabetes	Gliclazide	80mg	cap/tablet	Diamicon/Servier
	21	Hypertension	Hydrochlorothiazide	25mg	cap/tablet	Dichlotride/MSD
	22	Pain/inflammation	Ibuprofen	400mg	cap/tablet	Brufen/Knoll
	23	Diabetes	Metformin	500mg	cap/tablet	Glucophage/BMS
	24	Infectious disease	Metronidazole	200mg	cap/tablet	Flagyl/Sanofi-Aventis
	25	Hypertension	Nifedipine Retard	20mg	tab	Adalat/Bayer

	26	Ulcer	Ranitidine	150mg	cap/ta b	Zantac/GSK
	27	Epilepsy	Sodium Valproate	200mg	cap/ta b	Epilim/ Sanofi- Aventis
Supplementary list	28	Infectious disease	Co-trimoxazole	80mg+400 mg	cap/ta b	Bactrim/Roche
	29	Pain/inflammation	Paracetamol	500mg	cap/ta b	Panadol/GSK
	30	Viral infection	Aciclovir	200mg	cap/ta b	Zovirax/GSK
	31	Epilepsy	Carbamazepine	100mg	cap/ta b	Tegretol/Novartis
	32	Infectious disease	Cefradine	500mg	injection	Velosef/B-M Squibb
	33	Cardiovascular disease	Digoxin	0.25mg	cap/ta b	Lanoxin/GSK
	34	Infectious disease	Fluconazole	150mg	cap/ta b	Diflucan/Prizer
	35	Infectious disease	Ketoconazole	200mg	cap/ta b	Nizoral/Janssen
	36	Hypertension	Losartan	50mg	cap/ta b	Cozaar/MSD
	37	Epilepsy	Phenytoin	50mg	cap/ta b	Epanutin/Prizer
	38	Tuberculosis	Rifampicin	150mg	cap/ta b	Rimactane/Novartis
	39	Hypercholesterolaemia	Lovastatin	20mg	cap/ta b	Mevacor/Merk
	40	Infectious disease	Ofloxacin	200mg	cap/ta b	Tarivid/Aventis
	41	Asthma	Aminophylline	100mg	cap/ta b	
	42	Fungal infection	Miconazole Nitrate	2%	cream	Daktarin/Janssen
	43	Infectious disease	Erythromycin	250mg	cap/ta b	Pantomicina/Abbott
	44	Infectious disease	Azithromycin	250mg	cap/ta b	Zithromax/Pfizer
	45	Ulcer	Cimetidine	200mg	cap/ta b	Tagamet/Smithkline
	46	Hypertension	Lisinopril	10mg	cap/ta b	Zestril/AstraZeneca
	47	Anaphylaxis, allergy	Loratadine	10mg	cap/ta b	Clarityne/Schering Plough

Annex 2. Medicine data collection form Medicine Price Data Collection Form

Generic name, dosage form, strength	Medicine Type	Brand or product name(s)	Manufacturer	Available yes/no	Pack size recommended	Pack size found	Price of pack found	Unit price (4 decimal places)	Comments
Albendazole 200 mg cap/tab (non-chewable) 阿苯达唑	Originator brand	Zentel 肠虫清	GSK		2			per cap/tab (non-chewable)	
	Lowest-priced generic				2			per cap/tab (non-chewable)	
Amitriptyline 25 mg cap/tab 阿米替林	Originator brand	Tryptizol 阿米替林	MSD		100			per cap/tab	
	Lowest-priced generic				100			per cap/tab	
Amlodipine 5 mg cap/tab 氨氯地平	Originator brand	Norvasc 络活喜	Pfizer		30			per cap/tab	
	Lowest-priced generic				30			per cap/tab	
Amoxicillin 500 mg cap/tab 阿莫西林	Originator brand	Amoxil 奥纳欣	Squibb		21			per cap/tab	
	Lowest-priced generic				21			per cap/tab	
Atenolol 50 mg cap/tab 阿替洛尔	Originator brand	Tenormin 天诺敏	AstraZeneca		60			per cap/tab	
	Lowest-priced generic				60			per cap/tab	
Atorvastatin 20 mg cap/tab 阿托伐他汀	Originator brand	Lipitor 立普妥	Pfizer		30			per cap/tab	
	Lowest-priced				30			per cap/tab	

	generic								
Beclometasone inhaler 50 mcg/dose dose 倍氯米松	Originator brand	Becotide 必可酮	GSK		200			per dose	
	Lowest-priced generic				200			per dose	
Captopril 25 mg cap/tab 卡托普利	Originator brand	Capoten 开博通	BMS 百时美 施贵宝		60			per cap/tab	
	Lowest-priced generic				60			per cap/tab	
Ceftriaxone injection 1 g/vial vial 头孢曲松	Originator brand	Rocephin 罗氏芬	Roche		1			per vial	
	Lowest-priced generic				1			per vial	
Cephalexin 250 mg cap/tab 头孢氨苄	Originator brand	Keflex 先锋IV	Eli Lilly		28			per cap/tab	
	Lowest-priced generic				28			per cap/tab	
Ciprofloxacin 500 mg cap/tab 环丙沙星	Originator brand	Ciproxin 西普乐	Bayer		10			per cap/tab	
	Lowest-priced generic				10			per cap/tab	
Diazepam 5 mg cap/tab 地西洋	Originator brand	Valium 安定	Roche		100			per cap/tab	
	Lowest-priced generic				100			per cap/tab	
Diclofenac 50 mg cap/tab	Originator brand	Voltarol 扶他林	Novartis 诺华		100			per cap/tab	

二氯酚酸	Lowest-priced generic				100			per cap/tab	
Enalapril 10 mg cap/tab 依那普利	Originator brand	Renitec 悦宁定	MSD 默沙东		30			per cap/tab	
	Lowest-priced generic				30			per cap/tab	
Fluoxetine 20 mg cap/tab 氟西汀	Originator brand	Prozac 百忧解	Eli Lilly		30			per cap/tab	
	Lowest-priced generic				30			per cap/tab	
Glibenclamide 5 mg cap/tab 格列本脲	Originator brand	Daonil 达安辽	Sanofi-Aventis		60			per cap/tab	
	Lowest-priced generic				60			per cap/tab	
Gliclazide 80 mg cap/tab 格列齐特	Originator brand	Diamicon 达美康	Servier		100			per cap/tab	
	Lowest-priced generic				100			per cap/tab	
Hydrochlorothiazide 25 mg cap/tab 氢氯噻嗪	Originator brand	Dichlotride 氢氯噻嗪	MSD		30			per cap/tab	
	Lowest-priced generic				30			per cap/tab	
Ibuprofen 400 mg cap/tab 布洛芬	Originator brand	Brufen 布洛芬	Knoll		30			per cap/tab	
	Lowest-priced generic				30			per cap/tab	
Metformin 500 mg cap/tab	Originator brand	Glucophage 格华止	BMS		100			per cap/tab	

二甲双胍	Lowest-priced generic				100			per cap/tab
Metronidazole 200 mg cap/tab 甲硝唑	Originator brand	Flagyl 灭滴灵	Sanofi-Aventis		28			per cap/tab
	Lowest-priced generic				28			per cap/tab
Nifedipine Retard 20 mg tab 硝苯地平	Originator brand	Adalat Retard 拜新同	Bayer		30			per tab
	Lowest-priced generic				30			per tab
Omeprazole 20 mg cap/tab 奥美拉唑	Originator brand	Losec 洛赛克	Astra Zeneca		30			per cap/tab
	Lowest-priced generic				30			per cap/tab
Ranitidine 150 mg cap/tab 雷尼替丁	Originator brand	Zantac 善胃得	GSK		60			per cap/tab
	Lowest-priced generic				60			per cap/tab
Salbutamol inhaler 100 mcg/dose 沙丁胺醇	Originator brand	Ventoline 舒喘灵	GSK		200			per dose
	Lowest-priced generic				200			per dose
Simvastatin 20 mg cap/tab 斯伐他汀	Originator brand	Zocor 舒降之	MSD		30			per cap/tab
	Lowest-priced generic				30			per cap/tab
Sodium Valproate 200 mg cap/tab	Originator brand	Epilim 艾匹灵	Sanofi-Aventis		100			per cap/tab

丙戊酸钠	Lowest-priced generic				100				per cap/tab
Aciclovir 200 mg tab 阿昔洛韦	Originator brand	Zovirax 苏维乐	GSK		25				per tab
	Lowest-priced generic				25				per tab
Aminophylline 100 mg tab 氨茶碱	Originator brand								per tab
	Lowest-priced generic								per tab
Azithromycin 250 mg cap/tab 阿奇霉素	Originator brand	Zithromax 希舒美	Pfizer						per cap/tab
	Lowest-priced generic								per cap/tab
Carbamazepine 100 mg cap/tab 卡马西平	Originator brand	Tegretol 得理多	Novartis		100				per cap/tab
	Lowest-priced generic				100				per cap/tab
Cefradine 500 mg injection 头孢拉定	Originator brand	Velosef 泛捷复	B-M Squibb		1				per vial
	Lowest-priced generic				1				per vial
Cimetidine 200mg tab 西咪替丁	Originator brand	Tagamet 泰为美	Smithkline 史克		100				per tab
	Lowest-priced generic				100				per tab
Co-trimoxazole 8+40 cap/tab 复方	Originator brand	Bactrim 复方新诺明	Roche		100				per cap/tab

新诺明	Lowest-priced generic				100			per cap/tab
Digoxin 0.25 mg tab 地高辛	Originator brand	Lanoxin 拉诺辛	GSK		100			per tab
	Lowest-priced generic				100			per tab
Erythromycin 250 mg tab 红霉素	Originator brand	Pantomicina 红霉素	ABBOT T 雅培					per tab
	Lowest-priced generic							per tab
Fluconazole 150mg cap/tab 氟康唑	Originator brand	Diflucan 大扶康	Prizer		30			per cap/tab
	Lowest-priced generic				30			per cap/tab
Ketoconazole 200 mg tab 酮康唑	Originator brand	Nizoral 里素劳片	Janssen		10			per tab
	Lowest-priced generic				10			per tab
Lisinopril 10mg tab 赖诺普利	Originator brand	Zestril	Astrazene ca		14			per tab
	Lowest-priced generic				14			per tab
Loratadine 10mg tab 氯雷他定	Originator brand	Clarityne	Schering Plough		6			per tab
	Lowest-priced generic				6			per tab
Losartan 50 mg tab 氯沙坦	Originator brand	Cozaar 科素亚	MSD		30			per tab
	Lowest-priced generic				30			per tab

Lovastatin 20 mg cap/tab 洛伐他汀	Originator brand	Mevacor 美降脂	Merk		60			per cap/tab
	Lowest-priced generic				60			per cap/tab
Miconazole Nitrate 2% cream 硝酸咪康唑	Originator brand	Miconazole Nitrate 达克 宁	Janssen		20			per G
	Lowest-priced generic				20			per G
Ofloxacin 200 mg tab 氧氟沙星	Originator brand	Tarivid 泰利必妥	Aventis		100			per tab
	Lowest-priced generic				100			per tab
Paracetamol 500mg cap/tab 扑热息痛	Originator brand	Panadol 必理通	GSK		60			per cap/tab
	Lowest-priced generic				60			per cap/tab
Phenytoin 50 mg cap/tab 苯妥英	Originator brand	Epanutin 地伦丁	Prizer		100			per cap/tab
	Lowest-priced generic				100			per cap/tab
Rifampicin 150 mg tab 利福平	Originator brand	Rimactan 甲哌利复霉 素	Novartis		100			per tab
	Lowest-priced generic				100			per tab

Annex 3. Availability of individual medicines, public and private sector

Medicine Name	National EML (yes/no)	% outlets where medicine was found Public sector (n = 50 outlets)		% outlets where medicine was found Private sector(n = 36 outlets)	
		Originator brand	Lowest price generic	Originator brand	Lowest price generic
Aciclovir	yes	0	0	0	27.8
Albendazole	yes	32.0	10.0	94.4	8.3
Aminophylline	yes	0	78.0	0	75.0
Amitriptyline	yes	0	16.0	0	22.2
Amlodipine	no	32.0	22.0	58.3	41.7
Amoxicillin	yes	0	16.0	2.8	77.8
Atenolol	yes	0	0	0	0
Atorvastatin	no	26.0	2.0	63.9	5.6
Azithromycin	yes	6.0	52.0	8.3	88.9
Beclometasone inhaler	no	14.0	0	22.2	0
Captopril	yes	0	82.0	0	100
Carbamazepine	yes	0	46.0	0	72.2
Cefradine	no	0	4.0	0	19.4
Ceftriaxone injection	yes	16.0	76.0	2.8	69.4
Cephalexin	yes	0	18.0	0	50.0
Cimetidine	no	0	50.0	0	77.8
Ciprofloxacin	yes	0	0	0	11.1
Co-trimoxazole	yes	0	62.0	0	83.3
Diazepam	yes	0	4.0	0	0
Diclofenac	yes	0	20.0	0	27.8
Digoxin	yes	0	68.0	2.8	72.2
Enalapril	yes	0	52.0	0	94.4
Erythromycin	yes	0	4.0	0	2.8
Fluconazole	yes	0	4.0	5.6	19.4
Fluoxetine	no	8.0	4.0	19.4	11.1
Glibenclamide	yes	0	0	0	5.6
Gliclazide	no	34.0	28.0	61.1	52.8
Hydrochlorothiazide	yes	0	70.0	0	80.6
Ibuprofen	yes	0	0	0	2.8
Ketoconazole	no	30.0	0	75.0	0
Lisinopril	no	0	2.0	2.8	11.1
Loratadine	no	18.0	18.0	91.7	44.4
Losartan	no	18.0	6.0	33.3	11.1
Lovastatin	no	0	14.0	0	50.0
Metformin	yes	18.0	6.0	50.0	41.7
Metronidazole	yes	0	98.0	0	94.4

Miconazole Nitrate	yes	84.0	4.0	94.4	22.2
Nifedipine Retard	yes	0	32.0	19.4	61.1
Ofloxacin	yes	0	0	0	8.3
Omeprazole	no	20.0	80.0	36.1	86.1
Paracetamol	yes	0	6.0	2.8	13.9
Phenytoin	yes	0	28.0	0	47.2
Ranitidine	yes	0	50.0	0	91.7
Rifampicin	yes	0	44.0	0	83.3
Salbutamol inhaler	yes	30.0	20.0	30.6	61.1
Simvastatin	no	24.0	16.0	50.0	50.0
Sodium Valproate	yes	0	32.0	2.8	69.4

Annex 4. Median Price Ratios, public sector procurement prices
(where medicines found in at least one outlet)

Medicine Name	Originator brand MPR (25th, 75th %iles)	Lowest price generic MPR (25th, 75th %iles)
Albendazole	5.02(5.02, 5.02)	1.51(1.51,1.51)
Aminophylline		0.20(0.20, 0.20)
Amitriptyline		3.60(3.60, 3.60)
Amlodipine	25.61(25.61, 25.61)	5.16(5.16, 8.36)
Amoxicillin		2.58(1.30, 3.07)
Atorvastatin	2.22(2.22, 2.22)	0.90(0.90, 0.90)
Azithromycin	9.78(9.78, 9.78)	0.43(0.36, 0.70)
Beclometasone inhaler	2.55(2.55, 2.55)	
Captopril		0.35(0.29, 0.46)
Carbamazepine		0.07(0.07, 0.08)
Cefradine		1.28(1.26, 1.29)
Ceftriaxone injection	17.41(17.41, 17.41)	0.42(0.32, 0.82)
Cephalexin		0.65(0.39, 2.91)
Cimetidine		0.52(0.47, 0.86)
Co-trimoxazole		0.85(0.85, 0.85)
Diazepam		1.49(1.37, 1.61)
Diclofenac		21.87(21.87, 21.87)
Digoxin		1.25(1.25, 1.25)
Enalapril		7.83(7.82, 10.39)
Erythromycin		12.36(12.36, 12.36)
Fluconazole		9.19(6.60, 11.78)
Fluoxetine	108.39(108.39, 108.39)	34.95(31.96, 37.93)
Gliclazide	11.43(11.43, 11.43)	4.38(2.41, 11.43)
Hydrochlorothiazide		0.46(0.46, 0.46)
Ketoconazole	5.57(5.57, 5.57)	
Lisinopril		4.16(4.16, 4.16)
Loratadine	27.25(19.97, 27.25)	5.68(4.61, 14.69)
Losartan	2.90(2.90, 2.90)	1.98(1.98, 1.98)
Lovastatin		4.79(4.32, 5.26)
Metformin	18.17(18.17, 18.17)	6.70(5.55, 6.70)
Metronidazole		0.65(0.60, 0.65)
Miconazole Nitrate	8.49(8.49, 8.49)	1.36(1.36, 1.36)
Nifedipine Retard		4.15(3.82, 4.15)
Omeprazole	56.59(56.59, 56.59)	1.68(0.81, 3.32)
Paracetamol		5.63(3.18, 5.63)
Phenytoin		0.02(0.01, 0.02)
Ranitidine		0.47(0.37, 0.47)
Rifampicin		0.55(0.43, 0.55)
Salbutamol inhaler	2.27(2.27, 2.27)	0.33(0.33, 0.33)
Simvastatin	6.86(6.86, 6.86)	3.17(2.98, 6.37)

Sodium Valproate		0.21(0.20, 0.21)
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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)
Albendazole	5.80 (5.73, 6.25)	1.56 (1.56, 1.56)
Aminophylline		0.36 (0.24, 0.41)
Amitriptyline		4.14 (4.14, 4.62)
Amlodipine	29.46 (29.46, 29.46)	7.01 (6.59, 9.54)
Amoxicillin		2.97 (1.68, 3.56)
Atorvastatin	2.55 (2.55, 2.55)	
Azithromycin		0.71 (0.37, 0.90)
Beclometasone inhaler	2.93 (2.93, 2.94)	
Captopril		0.40 (0.34, 0.60)
Carbamazepine		0.08 (0.08, 0.11)
Ceftriaxone injection	20.01 (20.01, 20.11)	0.59 (0.47, 1.10)
Cephalexin		0.76 (0.45, 3.34)
Cimetidine		0.82 (0.61, 0.99)
Co-trimoxazole		1.11 (1.03, 1.18)
Diclofenac		25.34 (24.02, 27.45)
Digoxin		1.43 (1.43, 1.48)
Enalapril		8.99 (8.77, 11.98)
Fluoxetine	124.67 (121.97, 127.21)	
Gliclazide	13.15 (13.04, 13.15)	5.04 (2.78, 13.01)
Hydrochlorothiazide		0.79 (0.53, 1.65)
Ketoconazole	6.45 (6.40, 6.73)	
Loratadine	31.25 (23.77, 32.32)	8.68 (5.68, 16.83)
Losartan	3.33 (3.33, 3.44)	
Lovastatin		5.53 (4.93, 6.05)
Metformin	20.89 (20.89, 21.27)	
Metronidazole		0.83 (0.75, 1.07)
Miconazole Nitrate	9.80 (9.74, 9.86)	
Nifedipine Retard		4.67 (4.39, 5.20)
Omeprazole	65.06 (65.06, 66.50)	2.12 (1.63, 4.51)
Phenytoin		0.02 (0.01, 0.03)
Ranitidine		0.53 (0.42, 0.62)
Rifampicin		0.63 (0.60, 0.64)
Salbutamol inhaler	2.62 (2.62, 3.22)	0.42 (0.40, 0.50)
Simvastatin	10.16 (7.89, 16.44)	4.09 (3.35, 7.05)
Sodium Valproate		0.23 (0.23, 0.24)

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)
Aciclovir		1.65(0.56, 1.74)
Albendazole	5.69(5.58, 6.97)	
Aminophylline		0.36(0.36, 0.47)
Amitriptyline		4.73(4.26, 5.05)
Amlodipine	26.81(24.31, 27.89)	5.48(5.08, 7.22)
Amoxicillin		1.85(1.63, 1.96)
Atorvastatin	2.25(2.10, 2.40)	
Azithromycin		1.06(0.77, 1.41)
Beclometasone inhaler	2.79(2.58, 3.04)	
Captopril		0.37(0.32, 1.04)
Carbamazepine		0.08(0.08, 0.10)
Cefradine		1.53(1.14, 2.16)
Ceftriaxone injection		0.53(0.43, 0.68)
Cephalexin		0.65(0.49, 0.74)
Cimetidine		0.51(0.47, 0.66)
Ciprofloxacin		0.50(0.33, 0.72)
Co-trimoxazole		0.98(0.91, 1.09)
Diclofenac		22.51(20.87, 23.61)
Digoxin		1.25(1.18, 1.36)
Enalapril		11.30(6.48, 13.06)
Fluconazole		3.74(3.32, 4.08)
Fluoxetine	116.77(100.63, 124.59)	29.62(28.34, 36.71)
Gliclazide	10.85(10.13, 11.26)	3.67(2.38, 6.67)
Hydrochlorothiazide		0.69(0.46, 0.69)
Ketoconazole	5.80(5.51, 6.15)	
Lisinopril		4.65(4.06, 5.26)
Loratadine	22.97(19.37, 26.58)	12.59(8.51, 16.66)
Losartan	2.94(2.62, 3.23)	2.57(2.28, 2.68)
Lovastatin		5.72(2.63, 6.81)
Metformin	18.01(16.95, 19.45)	1.08(0.68, 7.74)
Metronidazole		0.72(0.68, 0.75)
Miconazole Nitrate	8.31(7.84, 8.76)	6.26(5.65, 6.98)
Nifedipine Retard	30.15(8.35, 34.24)	4.35(3.95, 4.74)
Omeprazole	60.18(58.23, 60.18)	3.09(1.63, 4.23)
Paracetamol		6.11(6.11, 17.37)
Phenytoin		0.02(0.02, 0.02)
Ranitidine		0.52(0.46, 0.52)
Rifampicin		0.51(0.47, 0.56)
Salbutamol inhaler	2.42(2.35, 2.58)	0.36(0.34, 0.38)
Simvastatin	8.36(7.75, 10.02)	3.63(2.87, 4.67)
Sodium Valproate		0.23(0.22, 0.24)