Prices, availability, affordability and price components of medicines to treat non-communicable diseases in Iran

Report of a survey undertaken in 2014 by the Ministry of Health

June 2015

Introduction

Lack of reliable access to needed medicines is a growing concern worldwide especially in economically fragile countries. The burden is greatest for people with non-communicable diseases (NCDs) that require life-long treatment. This report about the price, availability, affordability and price components of essential medicines to treat NCDs in Iran is one of a series of papers summarizing the results of NCD medicine price and availability surveys carried out in the Middle East using a methodology developed by the World Health Organization (WHO) and Health Action International (HAI)[1].

This survey was conducted in 2014 by the Ministry of Health. The WHO/HAI methodology, published as a manual with accompanying Excel workbooks for data entry and analysis, is a facility-based survey with data collected for selected medicines in six geographic or administrative areas in a sample of public sector facilities, private pharmacies, and optionally in medicine outlets in other sectors (eg. private pharmacies in public hospitals). Data are also collected on procurement prices. The methodology expresses medicine affordability as the number of days the lowest paid unskilled government worker would have to work to pay for 30 days treatment for NCD medicines using standard treatment regimens (or 7 days for acute conditions).

The survey in Iran assessed the following:

- The availability and patient price for key NCD medicines
- How affordable medicines are for low-income people for the treatment of common NCDs
- Variations in prices, availability and affordability for NCD medicines within and across sectors (for originator brands, most sold generic equivalents and lowest priced generic equivalents), and in different regions of the country
- The price that the government pays for medicines
- Comparisons between government procurement prices for NCD medicines and patient prices in the public sector
- Comparisons between prices in Iran with international reference prices

[1] WHO/HAI Measuring medicine prices, availability, affordability and price components, 2008; http://haiweb.org/medicineprices/

- Charges added to medicines in the supply chain in the public and private sectors
- Comparisons of price, availability and affordability in this survey with those from the previous medicine price and availability survey conducted in 2007

Pharmaceutical sector in Iran

The population of Iran is around 77.2 million (2013 estimate), with a per capita GDP of $4,760 (World Bank 2013). Total per capita expenditure on health was $324, and per capita government expenditure on health was $206, in 2013. The pharmaceutical market is about 14 percent of total health expenditure and less than one percent of GDP.

There are about 150,000 physicians and 110,000 hospital beds in the country. Injuries, cardiovascular diseases, cancers, asthma, diabetes and depressive disorders have the greatest burdens.

In Iran there are about 90 local active pharmaceutical manufacturers (market share 95% in volume and 65% in value), about 140 importers with 30 large distributors and their wholesalers, and over 11000 pharmacies. Less than a thousand pharmacies belong to the public sector.

In Iran the procurement system is identical between the public and private sectors. All pharmacies in all sectors obtain their medicines from the same distributors. Except for vaccines and a few medicines for rare diseases there is no centralized bulk purchasing or specific procurement system for public health facilities.

All responsibilities are differentiated in the pharmaceutical supply chain; the importers and the producers supply their medicines after registering them with the Iran Food and Drug Administration. All pharmacies purchase from officially registered distributers and any direct relationship between pharmacies and importers or producers is prohibited.

All medicine prices are set in three levels (pharmacy, distributor and importer/producer) by the Iran FDA during the registration process and then updated annually.

A national generic medicines policy promotes and enforces the prescribing and dispensing of generic medicines. Generic substitution by pharmacists is permitted.

The set patient prices are identical in the public and private sectors. All prices are made publicly available on the website of the Food and Drug Administration.

Prices of locally-manufactured products are based on the cost of manufacturing plus mark-ups and other charges in the supply chain (cost-plus). Pharmacy remuneration consists of a percentage mark-up plus a dispensing fee. External reference pricing to Greece, Spain and Turkey is used to set the price for new imported medicines.

There are four main basic insurers who cover the majority of people (about 90% of population). Insurance covers 90% and 70% of the cost of medicines on the Insured Drug List (a subset of the registered list) for inpatients and outpatients, respectively. The reimbursed price is set at the level of the lowest priced equivalent on the market (patients must pay extra if requesting a higher priced equivalent product). The patient pays a co-payment and the pharmacy claims back the balance from the insurer. The premium for insurance coverage is shared between the employer, the employee and the government. Treatment costs for certain illnesses are fully covered by the Ministry of Health, such as HIV/AIDS, malaria, tuberculosis and routine vaccines. Certain medicines are also subsidized by the government (patients pay less than 3% of the cost). Both public and private sectors are included in the insurance system.

Government hospitals may have pharmacies owned or run by themselves or contracted out to private providers. The set patient price is the same regardless of the type of pharmacy. Primary health care centers stock only a limited selection of essential medicines.

The provision of medicines throughout the supply chain across the country are monitored and regulated by the pharmaceutical procurement office in the Iran FDA.

Despite the Iran FDA claims that patient prices are identical across the country and sectors, and medicines are affordable due to insurance coverage and are available in outlets, this study was undertaken to determine the situation in facilities.

Methodology

The survey was designed to answer the following questions:

- Are unaffordable medicine prices considered a barrier to accessing treatment?
- Does the data advocate a change in national policies?
- How efficient is the government medicine procurement system in terms of procuring low priced medicines?
- What are the differences between government procurement prices and patient prices in the public sector?

• What is the price and availability of originator brand products and generic equivalents within and across public sector medicine outlets, private retail pharmacies and private pharmacies situated in public hospitals?
• What mark-ups and duties contribute to the retail price of medicines?
• How affordable are medicines for people on low incomes?

Data was collected for a total of 61 medicines; 55 to treat NCDs such as cardiovascular disease, diabetes, asthma, mental health conditions etc. and 6 cancer medicines. Each medicine was strength- and dose form specific. All medicines were on the Iran EML.

Of the main list medicines, 15 had originator brand products (OB) registered in Iran: alprazolam, amlodipine, atorvastatin, carbamazepine, clopidogrel, clozapine, diclofenac, digoxin, enoxaparin syringe, epoetin alpha injection, hydrocortisone sodium succinate injection, metformin, methylphenidate HCL, salbutamol inhaler, and sodium valproate. The remainder of the OBs are not registered in the country or the OB was not identifiable as the medicine was old and never patented. For all main list medicines, the most sold generic product (MSG) was determined centrally, whereas the lowest priced generic product was determined in each facility.

Data was collected from a total of 30 public sector facilities, 30 private community retail pharmacies and 30 other sectors pharmacies (private pharmacies in public hospitals) in the capital Tehran and five provinces: Khorasan (Mashad), Yazd (Yazd), Sistan va Baluchistan (Zahedan), Gilan (Rasht) and Lorestan (Khoramabad) See Annex 1 for a map showing the survey areas.

Price and availability data for six cancer medicines were collected from 19 tertiary hospitals who supply cancer medicines, 13 private pharmacies in the community and 2 private pharmacies in public hospitals. Of the six cancer medicines, OBs were surveyed for five of them.

In addition to surveying patient prices, government procurement prices were obtained from the three major distributors in Iran for the main list medicines and two distributors for the cancer medicines.

All survey personnel were trained in a three day workshop conducted by Margaret Ewen, a consultant from HAI. This included pilot testing data collection in one public hospital and one private pharmacy. Data collection was carried out by 18 data collectors who were pharmacy students at the University of Tehran.

Table 1. Measurements in the survey

Measurement	Public sector	Private sector	Other sector
Main list medicines (55)			
Price to patient	✓	✓	✓
Availability	✓	✓	✓
No. of facilities visited	30	30	30
Procurement price	✓ (from 3 distributors)		
Cancer medicines (6)			
Price to patient	✓	✓	✓
Availability	✓	✓	✓
No. of facilities visited	19	13	2
Procurement price	✓ (from 2 distributors)		

Presentation of price information

The WHO/HAI survey methodology presents prices in local currency and as median price ratios (MPR). The MPR is calculated by dividing the local price by an international reference price (IRP). The IRP is converted to local currency using the exchange rate on the first day of data collection which, in this survey, was $1 US = 26017 Iranian Rials (IRR).

An MPR of 1 means the local price is equivalent to the reference price, whereas an MPR of 2 means the local price is twice the reference price. The international reference prices used for this survey were taken from the 2013 Management Sciences for Health (MSH) International Drug Price Indicator Guide (the MSH Guide pulls together information from recent price lists of not-for-profit and for-profit

medicine suppliers for multisource medicines and thus reflects the prices governments could be expected to pay when tendering for medicines); the use of reference prices facilitates international comparisons.

Interpretation of findings

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

Findings

Affordability

Affordability is calculated as the number of days the lowest paid unskilled government worker would have to work to pay for 1 month's treatment for medicines for chronic conditions. In Iran, the lowest paid unskilled government worker is on the minimum salary for those earning a wage (whether public or private sector employees). At the time of the survey, the lowest paid unskilled government worker earned 270,000 Iranian Rials (IRR) a day i.e. US$ 10.38 using the exchange rate on the first day of data collection. Having to spend more than 1 day's income per month on family medicine needs could be considered to be unaffordable.

As seen in Table 2, for main list medicines less than 1 days' salary was needed to purchase treatments as generics except for three injections i.e. epoetin alpha (8.2 days' salary), morphine (3.7 days' salary) and insulin (1.3 days' salary). Originator brands were generally less affordable. While a months' supply of OB metformin and OB diclofenac required less than one days' salary, OBs of other medicines required more i.e. clozapine (4.8 days' salary), atorvastatin (4.1 days' salary), clopidogrel (3.6 days' salary), carbamazepine (3.1 days' salary) and amlodipine (1.9 days days' salary).

Table 2. Affordability: number of days' salary to purchase treatments

Medicine and treatment regimen	Type	Public	Private	Other
Diabetes				
glibenclamide 5mg x60 tab	LPG/MSG	0.1	0.1	0.1
gliclazide 80mg x30 tab	MSG	0.2	0.2	0.1
	LPG	0.1	0.1	0.1
metformin 500mg x90 tab	OB	0.6	0.6	0.6
	LPG/MSG	0.2	0.2	0.2
human neutral & NPH insulin 100IU/ml, 3x10ml vial	LPG/MSG	1.3	1.3	1.3
Cardiovascular disease				
amlodipine 50mg x30 tab	OB	1.9	1.9	1.9
	LPG/MSG	0.1	0.1	0.1
atenolol 50mg x30 tab	LPG/MSG	<0.1	<0.1	<0.1
enalapril 5mg x 30 tab	LPG/MSG	0.1	0.1	0.1
hydrochlorothiazide x30 tab	LPG/MSG	<0.1	<0.1	<0.1
atorvastatin 20mg x30 tab	OB	4.1	4.1	4.1
	LPG/MSG	0.2	0.2	0.2
simvastatin 20mg x30 tab	LPG/MSG	0.2	0.2	0.2
clopidogrel 75mg x30 tab	OB	3.6	3.6	3.6
	LPG/MSG	0.9	0.9	0.9
Analgesics				
diclofenac 50mg x60 tab	OB	0.8	0.8	0.8
	LPG/MSG	0.1	0.1	0.1
morphine 10mg/ml inj x180ml	LPG/MSG	3.7		3.7
Peptic ulcer				
omeprazole 20mg x30 tab	MSG	0.3	0.3	0.3
	LPG	0.2	0.2	0.2
Asthma				
beclometasone inhaler 50mcg/dose x200 doses	LPG/MSG	0.3	0.3	0.3
salbutamol inhaler 100mcg/dose x200 doses	LPG/MSG	0.3	0.3	0.3
Other				
epoetin alpha 4000IU inj x12	LPG/MSG	8.2	8.2	8.2
carbamazepine 200mg x150 tab	OB	-	3.1	3.1
	LPG/MSG	0.6	0.6	0.6
amitriptyline 25mg x90 tab	LPG/MSG	0.1	0.1	0.1
fluoxetine 20mg x30 tab	LPG/MSG	0.1	0.1	0.1
clozapine 100mg x90 tab	OB		4.8	4.8
	LPG/MSG	1.0	1.0	1.0

tab/cap unless otherwise stated

Procurement prices

The overall government procurement price for the 11 originator brands purchased from the three distributors was 3.73 times the international reference prices (Table 3). The median price for both generic versions was 1.08 times the international reference prices. Half the generics procured had prices of 0.59 to about 2 times the reference prices.

All three distributors provide medicines to pharmacies in the public and private sectors at the same price.

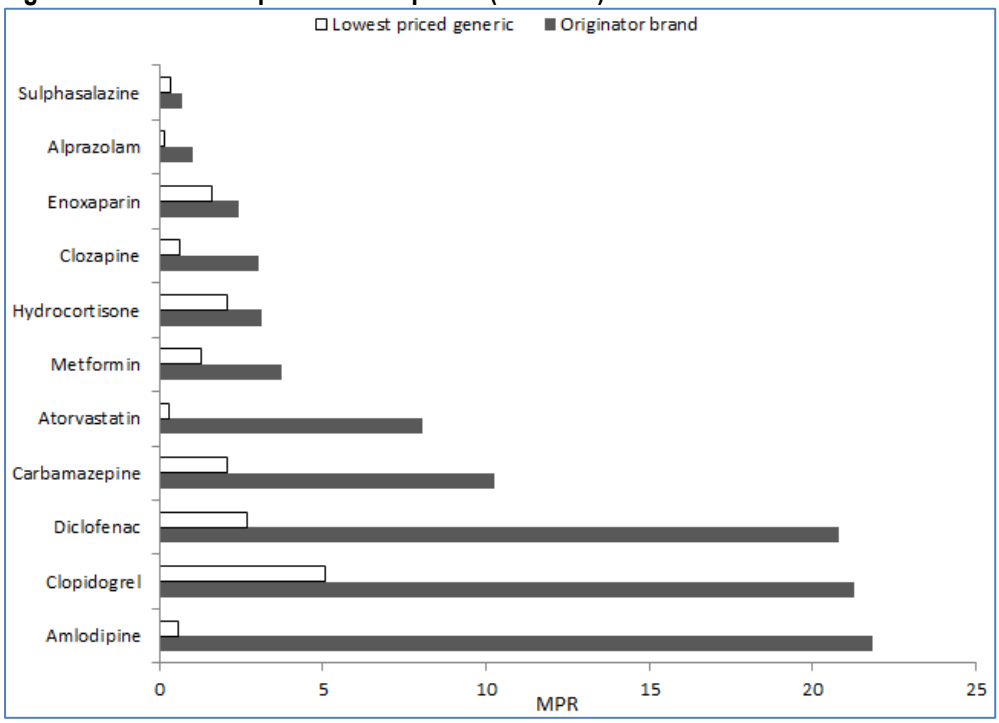
Table 3. Procurement prices compared to international reference prices (MPR)

	Originator brand	Most sold generic	Lowest priced generic
No. of meds. included	11	51	55
Median MPR	3.73	1.08	1.08
25 %ile MPR	2.73	0.59	0.59
75 %ile MPR	15.52	2.01	1.96
Minimum MPR	0.67	0.14	0.14
Maximum MPR	21.84	5.09	5.09

Of the 11 medicines with prices for both originator brands and generic equivalents (paired analysis), the originator brands were on average about 2.9 times (190%) the price of the generics. Overall, there was no difference in the price of most sold generics and lowest priced generics.

Figure 1 shows median price ratios for individual medicines found as both OBs and LPGs. The ratio of OB to LPG was greatest for amlodipine and atorvastatin tablets.

Figure 1. Government procurement prices (as MPRs) for individual medicines



Public sector availability

Across the 55 medicines surveyed, the mean availability of generics in the public sector facilities was 75.2 % (Table 4). Overall, the generic products selected as the most sold were found to be available in nearly half of the public facilities surveyed. The availability of the OBs averaged 25.7% (across the 15 medicines where the OB was registered).

Table 4. Mean availability of survey medicines in public health facilities

	Originator brand	Most sold generic	Lowest priced generic
Mean availability	25.7%	46.4%	75.2%
Std deviation availability	27.7%	21.0%	21.1%

Table 5 presents the availability (in six bands) of the surveyed medicines in the public sector facilities as generics. Thirty-one (31) of the 55 medicines were found in over 80% of the facilities. However, 8 medicines were found as generics in less than 50% of the facilities including carvedilol (16.7%) and methylphenidate (16.7%).

The availability of the originator brands were: alprazolam 43.3%, amlodipine 26.7%, atorvastatin 16.7%, carbamazepine 10.0%, clopidogrel 70.0%, clozapine 6.7%, diclofenac 16.7%, digoxin 73.3%, enoxaparin inj 80.0%, epoetin alpha inj 0%, hydrocortisone sod succ inj 10.0%, levothyroxine 0%, metformin 53.3%, methylphenidate 23.3%, salbutamol inhaler 0%, sod. valproate 0%, and sulphasalazine 6.7%.

Table 5. Availability of generics in public health facilities

Availability	Medicine
Not found	-
< 50%	Carvedilol, methylphenidate, levodopa/carbidopa, tamoxifen, digoxin, clozapine, enoxaparin injection, fluphenazine injection
50 - 60%	Lithium, morphine inj, epoetin alpha injection, gliclazide, simvastatin, sulphasalazine
61 - 80%	Losartan, folic acid, chlorpromazine injection, beclometasone inhaler, diclofenac, clopidogrel, furosemide, spironolactone, dimenhydrinate
81 - 99%	Acetyl salicylic acid, amlodipine, atenolol, glibenclamide, paracetamol, valproate, timolol eye drops, alprazolam, amitriptyline, cetirizine, epinephrine injection, hydrocortisone sod succ injection, Ibuprofen, isosorbide dinitrate, levothyroxine, omeprazole, atorvastatin, fluoxetine, hydrochlorothiazide, metformin, phenobarbital, phenytoin, trihexylphenidyl, carbamazepine, diazepam, enalapril, isophane human insulin, prednisolone, salbutamol syrup, neutral sol human insulin, salbutamol inhaler
100%	Dexamethasone injection

tab/cap unless otherwise stated

Public sector patient prices

Of the 15 OBs surveyed, nine medicines were found in at least four of the public sector facilities surveyed. As shown in Table 6, overall they were 4.10 times the international reference prices. Overall, LPGs were 1.07 times the international reference prices (interquartile range 0.65–2.03). Overall, MSGs were 1.13 times the international reference prices (interquartile range 0.65–2.24).

There was negligible difference in patient prices for the same medicine across the public sector pharmacies sampled, hence adherence to regulated prices was high.

Table 6. Public sector patient prices compared to international reference prices (MPR)

	Originator brand	Most sold generic	Lowest priced generic
No. of meds. included	9	52	55
Median MPR	4.10	1.13	1.07
25 %ile MPR	2.43	0.65	0.65
75 %ile MPR	22.82	2.24	2.03
Minimum MPR	1.14	0.15	0.15
Maximum MPR	24.02	5.70	5.70

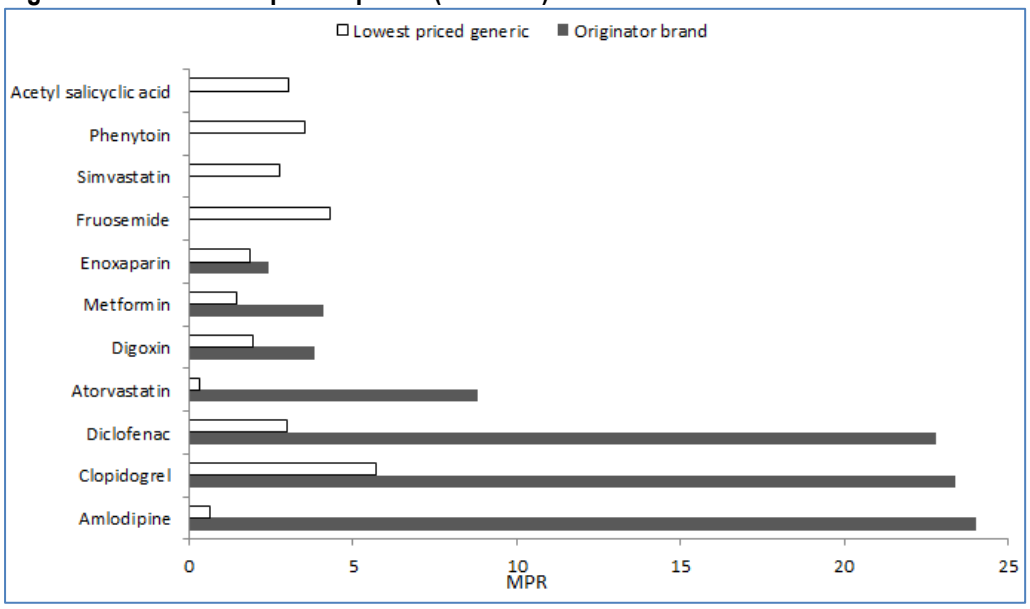
Table 7 shows the results of the paired analysis. Overall, OBs were 2.9 times higher-priced than LPGs (based on 9 medicines). There was little difference between the prices of MSGs and LPGs.

Table 7. Ratio matched pairs of product types, public sector facilities

	Ratio
Originator brand: most sold generic (n=7 medicines)	6.2
Originator brand: lowest priced generic (n=9 medicines)	2.9
Most sold generic: lowest priced generic (n=52 medicines)	1.1

Figure 2 shows the patient prices (MPRs) for some individual medicines in the public sector. Some older individual medicines were high priced even as lowest priced generics including furosemide, phenytoin and acetyl salicyclic acid.

Figure 2. Public sector patient prices (as MPRs) for individual medicines



Private sector availability

In private retail pharmacies in the community, mean availability for OBs was 41.4% while the mean availability of generics was 54.3 % for MSG and 84.8 % for LPG (Table 8).

Table 8. Mean availability of survey medicines in private community pharmacies

	Originator brand	Most sold generic	Lowest priced generic
Mean availability	41.6%	54.3%	84.8%
Std dev availability	32.7%	25.1%	22.7%

Table 9 presents the availability of the surveyed medicines as generics in the private retail pharmacies. Of the 55 medicines, 18 were found in all 30 outlets on the day of data collection and 41 were found in over 80% of the pharmacies. Morphine injection was not found in any of the surveyed pharmacies.

The availability of the originator brands were: alprazolam 76.6%, amlodipine 60.0%, atorvastatin 96.7%, carbamazepine 33.30%, clopidogrel 100.0%, clozapine 30.0%, diclofenac 36.7%, digoxin 83.3%, enoxaparin inj 66.7%, epoetin alpha inj 0%, hydrocortisone sod succ inj 16.7%, levothyroxine 33.3%, metformin 93.3%, methylphenidate 23.3%, salbutamol inhaler 0%, sod. valproate 0%, and sulphasalazine 16.7%.

Table 9. Availability of generics in private community pharmacies

Availability	Medicine
Not found	Morphine injection
< 50 %	Digoxin, epinephrine injection, fluphenazine injection levodopa + carbidopa, enoxaparin injection, methylphenidate
50 - 60%	Epoetin alpha injection, carvedilol, chlorpromazine injection
61 - 80%	Sulphasalazine, tamoxifen, clozapine, hydrocortisone sod. succ injection
81 - 99%	Valproate, spironolactone, beclometasone inhaler, diazepam, gliclazide, isophane human insulin, lithium carbonate, clopidogrel, dimenhydrinate, isosorbide dinitrate, levothyroxine, metformin, neutral sol human insulin, phenobarbital, phenytoin, simvastatin, trihexylphenidyl, alprazolam, amitriptyline, atorvastatin, furosemide, salbutamol inhaler, salbutamol syrup
100%	Amlodipine, atenolol, carbamazepine, cetirizine, dexamethasone injection, diclofenac, enalapril, fluoxetine, folic acid, glibenclamide, hydrochlorothiazide, ibuprofen, losartan, omeprazole, paracetamol, prednisolone, timolol maleate eye drops, acetyl salicyclic acid

tab/cap unless otherwise stated

Private sector patient prices

In private retail pharmacies in the community, the median price across 14 originator brands was 3.62 times higher than the international reference price (interquartile range 1.61 – 10.67) as shown in Table 10. Across 53 lowest priced generics, the median price was 1.21 times the international reference price (interquartile range 0.67 – 2.07).

As in the public sector, there was negligible variation in prices of the same medicine across the private retail pharmacies sampled.

Table 10. Patient prices, private community pharmacies, compared to international reference prices

	Originator brand	Most Sold generic	Lowest priced generic
No. of meds. included	14	50	53
Median MPR	3.62	1.20	1.21
25 %ile MPR	1.61	0.67	0.67
75 %ile MPR	10.67	2.28	2.07
Minimum MPR	0.68	0.15	0.15
Maximum MPR	24.02	5.70	5.70

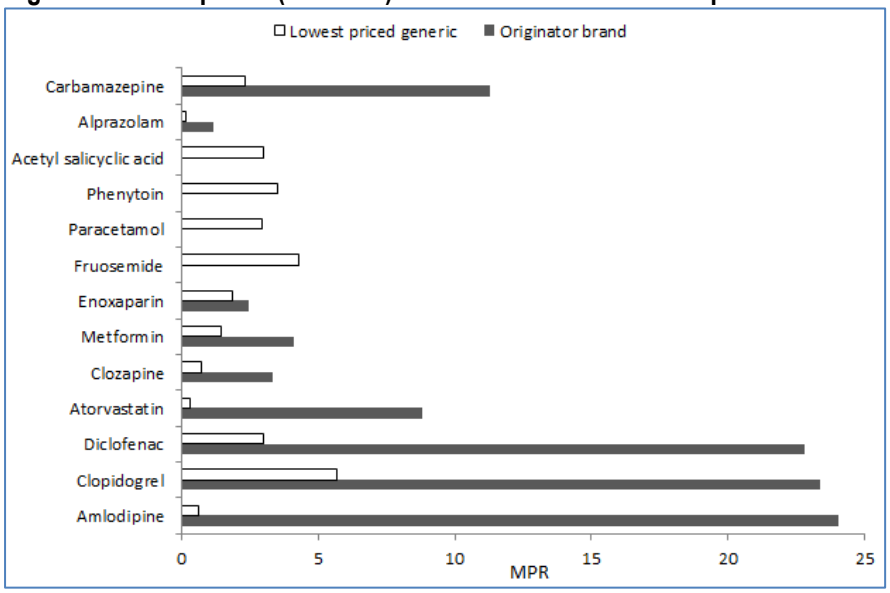
Table 11 shows the results of the paired analysis. Overall, OBs were 2.7 times higher-priced than LPGs (based on 13 medicines). There was little difference between the prices of MSGs and LPGs.

Table 11. Ratio matched pairs of product types in private community pharmacies

	Ratio
Originator brand: most sold generic (n=11 medicines)	5.8
Originator brand: lowest priced generic (n=13 medicines)	2.7
Most sold generic: lowest priced generic (n=50 medicines)	1.1

Figure 3 shows the patient prices (MPRs) for some individual medicines in the private community pharmacies. As with the other sectors, some older individual medicines were high priced, even when they were lowest priced generics.

Figure 3. Patient prices (as MPRs) for individual medicines in private community pharmacies



Availability in private pharmacies located in public hospitals ('Other' sector)

In private pharmacies located in public hospitals, mean availability of originator brands was 26.1% while the mean availability of generics was 80.3% (Table 12).

Table 12. Availability of the medicines in private pharmacies in public hospitals

	Originator brand	Most sold generic	Lowest priced generic
Mean availability	26.1%	50.6%	80.3%
Std dev availability	25.8%	19.8%	21.3%

Table 13 lists the availability of generics of the surveyed medicines in the private retail pharmacies in public hospitals. Of the 55 medicines surveyed, 7 were found in all 30 pharmacies on the day of data collection. Thirty-three (33) of the 55 medicines were found in over 80% of the pharmacies. Four medicines had less than 50% availability.

The availability of the originator brands were: alprazolam 50.0%, amlodipine 36.7%, atorvastatin 26.7%, carbamazepine 30.0%, clopidogrel 76.7%, clozapine 16.7%, diclofenac 3.3%, digoxin 60.0%, enoxaparin inj 70.0%, epoetin alpha inj 0%, hydrocortisone sod succ inj 3.3%, levothyroxine 0%, metformin 40.0%, methylphenidate 20.0%, salbutamol inhaler 0%, sod. valproate 3.3%, and sulphasalazine 6.7%.

Table 13. Availability of generics in private retail pharmacies in public hospitals

Availability	Medicine
Not found	-
< 50 %	Fluphenazine injection, tamoxifen citrate, enoxaparin syringe, methylphenidate HCL
50 - 60%	Carvedilol, sulphasalazine levodopa + carbidopa, epoetin alpha injection, morphine injection, digoxin
61 - 80%	Dimenhydrinate, phenobarbital, lithium carbonate, sodium valproate, phenytoin, clozapine, simvastatin, chlorpromazine injection, epinephrine injection, gliclazide, spironolactone, acetyl salicyclic acid
81 - 99%	Amlodipine, atenolol, dexamethasone injection, fluoxetine, glibenclamide, isophane human insulin, isosorbide dinitrate, levothyroxine, amitriptyline, beclometasone inhaler, carbamazepine, cetirizine, enalapril, folic acid, furosemide, losartan, metformin, prednisolone, salbutamol inhaler, diclofenac, neutral sol human insulin, salbutamol syrup, timolol maleate eye drops, clopidogrel, diazepam, hydrocortisone sod succ injection
100%	Alprazolam, atorvastatin, hydrochlorothiazide, ibuprofen, omeprazole, paracetamol, trihexylphenidyl

tab/cap unless otherwise stated

Patient prices in private pharmacies located in public hospitals

As shown in Table 14, across 10 OBs median prices were 3.96 times higher than international reference prices. Overall, MSGs and LPGs were 1.21 times international reference prices. As in the other two sectors, there was negligible variation in prices of the same medicine in the pharmacies surveyed.

Table 14. Patient prices in private retail pharmacies in public hospitals (MPR)

	Originator brand	Most sold generic	Lowest priced generic
No. of meds. included	10	53	54
Median MPR	3.96	1.21	1.21
25 %ile MPR	2.65	0.66	0.66
75 %ile MPR	10.67	2.22	2.05
Minimum MPR	1.14	0.15	0.15
Maximum MPR	24.02	5.70	5.70

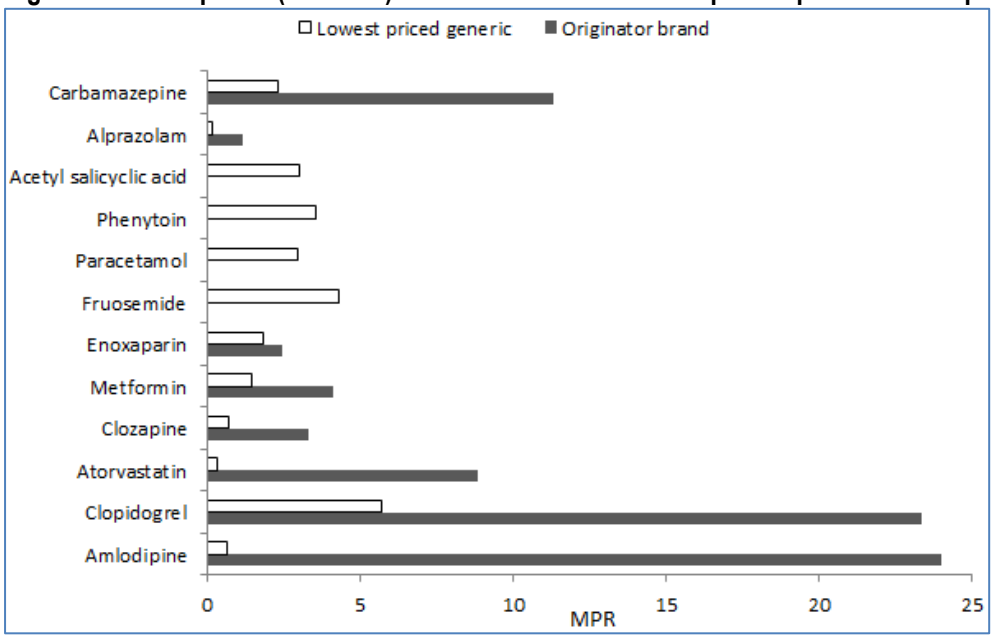
Table 15 shows the results of the paired analysis in this sector. Overall, OBs were 2.9 times higher-priced than LPGs (based on 9 medicines). There was no difference between the prices of MSGs and LPGs.

Table 11. Ratio matched pairs of product types in private pharmacies in public hospitals

	Ratio
Originator brand: most sold generic (n=8 medicines)	6.0
Originator brand: lowest priced generic (n=9 medicines)	2.9
Most sold generic: lowest priced generic (n=53 medicines)	1

Figure 4 shows the patient prices (MPRs) for some individual medicines in the private community pharmacies. As with the public and private sectors, some older individual medicines were high priced even as lowest priced generics, and there were some large differences in price ratios between OBs and LPGs (eg. amlodipine)

Figure 4. Patient prices (as MPRs) for individual medicines in private pharmacies in public hospitals



Inter-sectorial price comparisons

Public sector patient prices and government procurement prices (paired analysis)

Overall in the public sector, patients were paying 9.5% more for originator brands than the government was paying. (Table 12). Overall, patients were paying approximately the same price as the government for lowest priced generics, but 11% more for most sold generics.

Table 12. Summary of prices of medicines procured and sold in the public sector

	Med MPR public procurement prices	Med MPR public patient prices	% difference patient/govt. procurement
Originator brands (n=7)	8.06	8.82	9.5%
Most sold generics (n=48)	1.02	1.13	11.1%
Lowest priced generics (n=55)	1.08	1.07	-1.2%

Private sector patient prices and public sector patient prices (paired analysis)

As shown in Table 13, overall there was no difference in patient prices between private pharmacies in the community and the public sector for each of the product types..

Table 13. Patient prices in the public and private sectors (paired analysis)

	Med MPR public patient prices	Med MPR private patient prices	% difference private/public
Originator brands (n=9)	4.10	4.10	0%
Most sold generics (n=49)	1.20	1.20	0%
Lowest priced generics (n=53)	1.21	1.21	0%

Patient prices in private pharmacies in the community and private pharmacies in public hospitals (paired analysis)

As shown in Table 14, overall there was very little difference in patient prices between private pharmacies in the community and those located in public hospitals. for each of the product types.

Table 14. Patient prices in private pharmacies in the community and in public hospitals (paired analysis)

	Med MPR patient prices private pharm in the community	Med MPR patient prices private pharm in public hospitals	% difference hosp/comm
Originator brands (n=10)	3.96	3.96	0%
Most sold generics (n=50)	1.20	1.21	0.7%
Lowest priced generics (n=53)	1.21	1.21	0%

Patient prices in private pharmacies in public hospitals and public sector patient prices (paired analysis)

As shown in Table 15, overall there was no difference in patient prices between private pharmacies in public hospitals and the public sector for originator brands and only a very slight difference (0.7%) for most sold generics. But for lowest priced generics, prices in pharmacies in public hospitals were 6.3% high than for the same medicines in the public sector.

Table 15. Patient prices in private pharmacies in public hospitals and in the public sector (paired analysis)

	Med MPR public patient prices	Med MPR patient prices private pharm in public hospitals	% difference private/public
Originator brands (n=8)	3.96	3.96	0%
Most sold generics (n=52)	1.13	1.14	0.7%
Lowest priced generics (n=54)	1.14	1.21	6.3%

Cross-regional comparisons

Availability

Across the six survey regions, the mean availability of generics in the public sector ranged from 64% in Zahedan to 90% in Yadz (see Figure 4). In private pharmacies, the mean availability of generics ranged from 80% in Khoram to 90% in Mashhad. In private pharmacies in public hospitals the range was 70% in Zahedan to 88% in Yadz.

Figure 5. Mean availability of generics by survey region

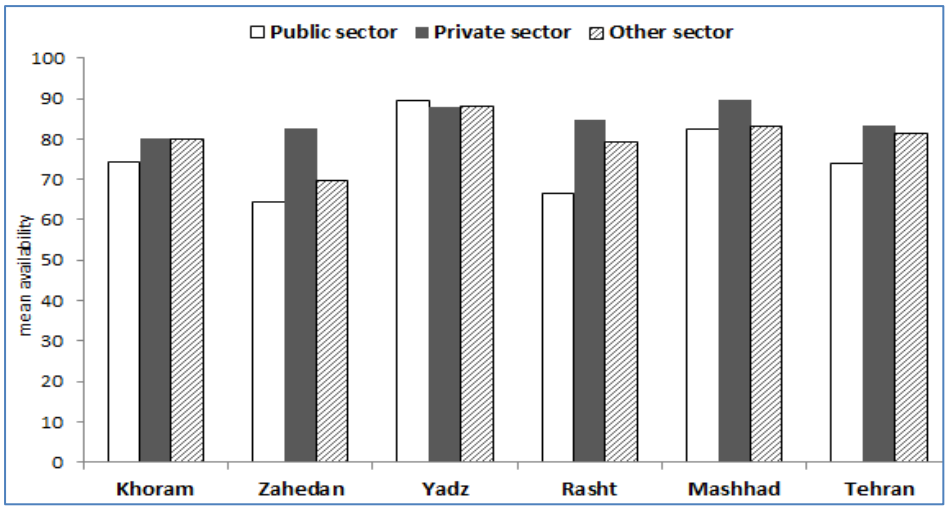
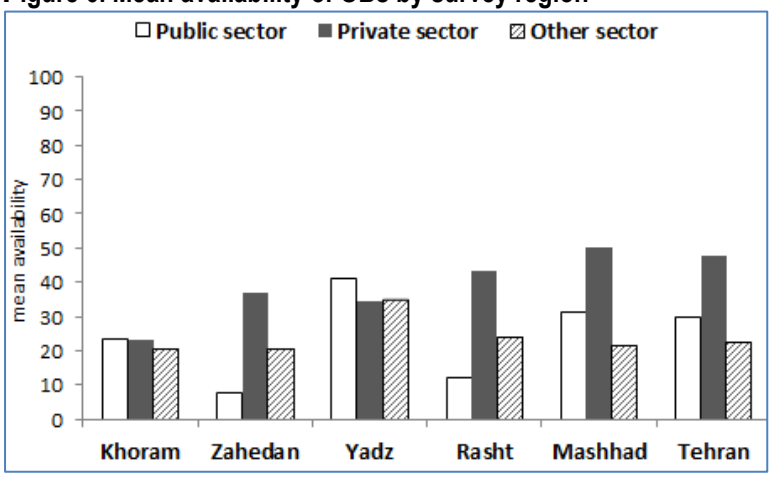


Figure 6 shows the mean availability of originator brands by survey area. There was greater variation in availability across the six areas for all three sectors than seen for generics.

Figure 6. Mean availability of OBs by survey region



Patient prices

In all three sectors, there was very little difference in patient prices across the six survey regions as shown in Figures 7-9. Note: for originator brands, the data were based on only a few products.

Figure 7. Patient prices (median MPR), public sector by survey region

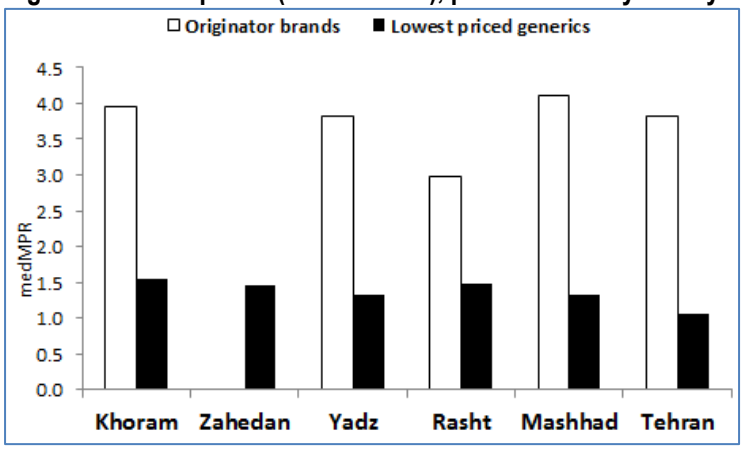


Figure 8. Patient prices (median MPR), private sector by survey region

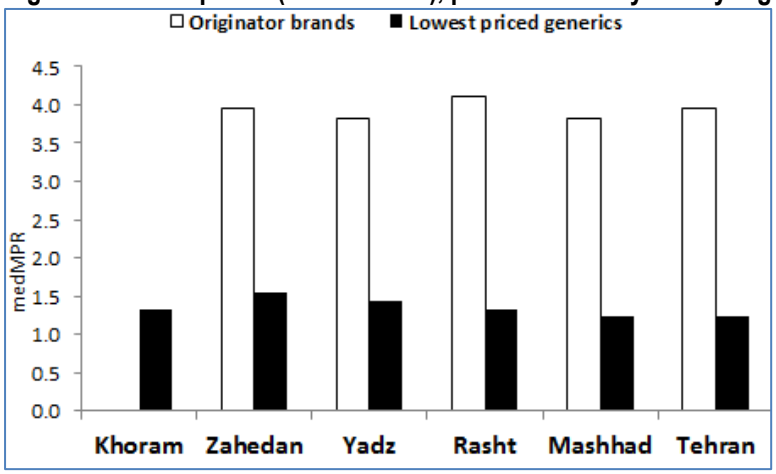
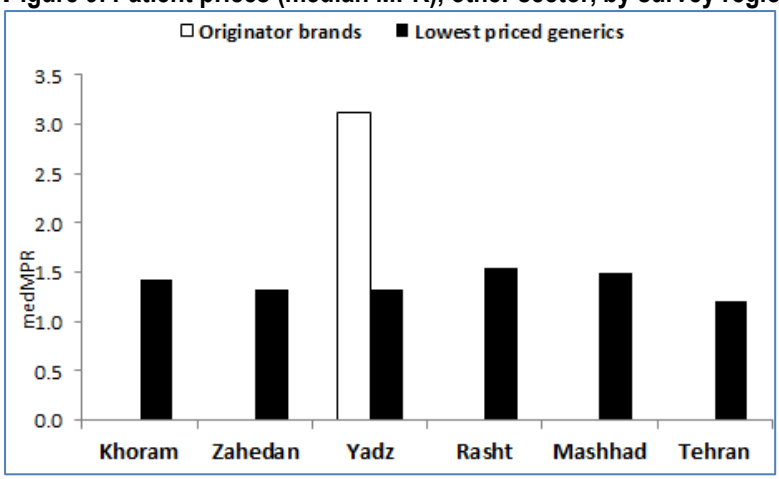


Figure 9. Patient prices (median MPR), other sector, by survey region



Price components

Price components in the supply chain were measured for a list of selected medicines in urban and rural districts of Tehran. We selected a mix of products i.e. imported, domestically produced, higher-priced and lower-priced medicines that have different price-setting methods. Total cumulative mark-ups ranged from 13% - 138% (Table 16). The contributions of the different price components to the final patient prices are shown in Table 17.For all the medicines in the analysis, the greatest contribution to the patient price was the manufacturers selling price (domestic products) and CIF price (imported price).

There was no difference between public and private sectors, and rural and urban areas. Imported vs. locally produced, and higher priced vs lower priced products, appeared to be the main variables on mark-ups. In both the public and private sectors, distributors' mark-ups were 8 - 12% and pharmacy mark-ups were 5 - 22%. The lowest mark-ups were for higher-priced products i.e. over one million IR Rials per unit. Domestically produced products had higher distribution and pharmacy mark-ups compared to imported products. There are a few high priced (over half a million Rials) domestically produced medicine that have lower distribution and pharmacy mark-ups (i.e. Cinnovex). The customs tariff is zero for imported medicines where no generics are manufactured locally but they still have to pay about 6 percent for customs clearance costs.

There are dispensing fees on prescriptions in pharmacies. A dispensing fee is fixed per prescription; it is higher when medicines are dispensed at night and can significantly contribute to the patient price for lower-priced medicines. The dispensing fee is not covered by insurers.

Differences in price components are illustrated by two products containing interferon B1 i.e. Cinnovex (generic) vs. Avonex (originator brand) as shown in Table 16. Cinnovex as a high-priced locally made product with a 8% distributors' mark-up, 5% pharmacy mark-up and a very small dispensing fee making a total mark-up in the supply chain of approximately 13%. By contrast, Avonex, which is imported has a total cumulative mark-up of about 50%. The difference is due to the 6% import tariff, 4% clearance charges, 11% importers mark-up and a slightly higher pharmacy mark-up of 8%. For clopidogrel. the originator brand (Plavix) is produced locally under

license, Zyllt is an imported generic and Osvix is a locally produced generic. Total cumulative mark-ups showed a wide range (27-97 percent).

Table 16. Mark-ups in the supply chain

Medicine Name	Imp* Vs. Dom**	Gen vs OB	Urban vs rural	Sector	Import-ation Costs	Distributor Mark-up	Pharmacy Mark-up	Dispense Fee	Total Cumulative Mark-up
Amlodipine	Dom	Gen	Urban	Public	0%	12%	22%	10000 IR (74%)	138%
Interferon B 1a (Cinnovex)	Dom	Gen	Urban	Public	0%	8%	5%	10000 IR (<1%)	13%
Interferon B 1a (Avonex)	Imp	OB	Urban	Public	22%	8%	8%	10000 IR (<1%)	50%
Epirubicin (Eberubi)	Imp	Gen	Urban	Public	22%	10%	15%	10000 IR (1%)	57%
Clopidogrel (Zyllt)	Imp	Gen	Urban	Public	56%	10%	15%	3500 IR (<1%)	97%
Clopidogrel (Osvix)	Dom	Gen	Urban	Public	0%	12%	21%	3500 IR (1%)	38%
Clopidogrel (Plavix)	Dom	OB	Urban	Public	0%	10%	15%	3500 IR (<1%)	27%
Metformin	Dom	Gen	Urban	Private	0%	12%	21%	3500 IR (5%)	43%
Atenolol	Dom	Gen	Rural	Private	0%	12%	22%	3500 IR (29%)	77%
Alprazolam	Dom	Gen	Urban	Private	0%	12%	22%	3500 IR (19%)	63%
Ranitidine	Dom	Gen	Rural	Private	0%	12%	22%	3500 IR (7%)	46%
Ranitidine (Ranover)	Dom	Gen	Urban	Private	0%	10%	15%	3500 IR (3%)	30%
Hydrocortisone	Dom	Gen	Urban	Private	0%	12%	22%	3500 IR (14%)	56%
Enoxaparin (Clexan)	Imp	OB	Urban	Public	27%	10%	15%	3500 IR (2%)	75%
Carbamazepine (Tegretol)	Imp	OB	Urban	Public	27%	10%	15%	3500 IR (1%)	72%
Dexamethasone	Dom	Gen	Rural	Public	0%	12%	22%	3500 IR (44%)	97%

* Domestically produced, ** Imported, Gen – generic, OB – originator brand

Table 17. Contribution of each stage in the supply chain to the final patient price

Medicine Name	Imp* Vs. Dom**	Gen vs OB	Urban vs rural	Sector	MSP/ CIF	Import-ation	Distrib-utor	Pharm-acy	Dispense fee
Amlodipine	Dom	Gen	Urban	Public	42%	0%	5%	10%	43%
Interferon B 1a (Cinnovex)	Dom	Gen	Urban	Public	88%	0%	7%	5%	<1%
Interferon B 1a (Avonex)	Imp	OB	Urban	Public	70%	16%	7%	7%	<1%

Epirubicin (Eberubi)	Imp	Gen	Urban	Public	64%	14%	8%	13%	1%
Clopidogrel (Zyllt)	Imp	Gen	Urban	Public	51%	28%	8%	13%	2%
Clopidogrel (Osvix)	Dom	Gen	Urban	Public	73%	0%	9%	17%	2%
Clopidogrel (Plavix)	Dom	OB	Urban	Public	79%	0%	8%	13%	<1%
Metformin	Dom	Gen	Urban	Private	70%	0%	8%	16%	5%
Atenolol	Dom	Gen	Rural	Private	57%	0%	7%	14%	23%
Alprazolam	Dom	Gen	Urban	Private	62%	0%	7%	15%	16%
Ranitidine	Dom	Gen	Rural	Private	69%	0%	8%	17%	6%
Ranitidine (Ranover)	Dom	Gen	Urban	Private	77%	0%	8%	13%	3%
Hydrocortisone	Dom	Gen	Urban	Private	64%	0%	8%	16%	12%
Enoxaparin (Clexan)	Imp	OB	Urban	Public	62%	16%	8%	13%	2%
Carbamazepine (Tegretol)	Imp	OB	Urban	Public	62%	16%	8%	13%	1%
Dexamethasone	Dom	Gen	Rural	Public	51%	0%	6%	13%	30%

* Domestically produced, ** Imported, Gen – generic, OB – originator brand

Comparison of price, availability and affordability with 2007

For the comparison of price, availability and affordability with the data from the previous project in 2007, 24 medicines that were common to both surveys were included in the analysis (same strength and same dose form). The MPRs were not adjusted for inflation or changes in the MSH price.

Looking back at the previous data, the population of Iran was around 71.2 million in 2007, with a per capita GDP of $3,805. Total per capita expenditure on health in 2006 had been $259, per capita government expenditure on health was $121, with total expenditure on health at 6.8% of GDP. General government expenditure on health was 46.5% of total health expenditure.

Table 18 shows the affordability of medicines has not significantly changed for many medicines. A small decrease in affordability of generic metformin and salbutamol inhaler and a little improvement in affordability of statins can be disregarded due to high and variable inflation rate in the country.

Table 18: Affordability: number of days' wages to purchase treatments 2007 vs. 2014

		Public sector outlets		Private retail pharmacies		Private pharmacies in public hospitals	
		2007	2014	2007	2014	2007	2014
Diabetes							
glibenclamide	LPG	< 0.1	0.1	< 0.1	0.1	< 0.1	0.1
gliclazide	LPG	0.1	0.1	0.1	0.1	0.1	0.1
metformin	OB	0.9	0.6	0.9	0.6	0.9	0.6
	LPG	0.1	0.2	0.1	0.2	0.1	0.2
Hypertension							
amlodipine	LPG	< 0.1	0.1	< 0.1	0.1	< 0.1	0.1
atenolol	LPG	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
hydrochlorothiazide	LPG	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hyperlipidemia							
atorvastatin	LPG	0.3	0.2	0.3	0.2	0.3	0.2
simvastatin	LPG	0.3	0.2	0.3	0.2	0.3	0.2
Arthritis							
diclofenac	LPG	< 0.1	0.1	< 0.1	0.1	< 0.1	0.1
Peptic ulcer							
omeprazole	LPG	0.2	0.2	0.2	0.2	0.2	0.2
Asthma							
beclometasone inhaler	LPG	0.3	0.3	0.3	0.3	0.3	0.3
salbutamol inhaler	LPG	0.2	0.3	0.2	0.3	0.2	0.3

Mean availability across the medicines were compared for originator brands and lowest priced generics for 2007 and 2014 (Most sold generics were not surveyed in 2007). Table 19 shows the availability of LPGs has decreased in the public sector and in private pharmacies in public hospitals, but relatively unchanged in private pharmacies. There were only 4 OBs with data for both years hence the results are not displayed.

Table 19. Comparison of mean availability of surveyed medicines in different sectors in 2007 and 2014

	Lowest priced generics (n=24)	
	2007	2014
public health facilities		
Mean availability	96.0 %	82.8%
Std dev availability	6.4 %	14.0%
private pharmacies		
Mean availability	95.9 %	94.3 %
Std dev availability	5.1 %	11.0 %
private pharmacies in public hospitals		
Mean availability	99.0 %	89.4 %
Std dev availability	1.8 %	12.6 %

In all three sectors for patient prices, median MPRs of LPGs showed a slight increase in 2014 with respect to international reference prices (Table 20). The MPRs for individual medicines increased in some cases but decreased in others.

Table 20. Comparison of the survey medicines' prices in different sectors in 2007 and 2014

	Lowest priced generics (n=24)	
	2007	2014
Public sector patient prices (MPR)		
Median MPR	1.35	1.78
Minimum MPR	0.49	0.30
Maximum MPR	3.26	4.31
Patient prices in private pharmacies (MPR)		
Median MPR	1.35	1.78
Minimum MPR	0.49	0.30
Maximum MPR	3.26	4.31
Patient prices in private pharmacies (MPR)		
Median MPR	1.33	1.78
Minimum MPR	0.49	0.30
Maximum MPR	3.26	4.31

Price, availability and affordability of anticancer medicines

Six cancer medicines were surveyed i.e. capecitabine 150mg tab (OB is Xeloda), cisplatin 50mg vial (no OB), docetaxel 80mg vial (OB is Taxotere), imatinib 400mg tab (OB is Glivec), letrozole 2.5mg tab (OB is Femara) and vincristine 1mg vial (OB is Oncovin). Note: imatinib 250mg tab is commonly used but was excluded as it had no MSH international reference price. Data collection was not limited to 5 pharmacies in each sector in an area; every pharmacy that was eligible to dispense anticancer medicines in each area was surveyed. Anticancer medicines are dispensed in some special pharmacies under the provincial control of the Food and Drug Administration. Most facilities for cancer treatment are concentrated in major provinces especially in Tehran. Therefore, it would be expected that availability of anticancer medicines would be lower in areas outside the capital.

Availability

In the public, private and other outlets, mean availability of any product type (originator brand or generic) was 71.1%, 57.7% and 83.3% respectively as shown in Table 21 (note: only two other sector outlets, i.e. private pharmacies in public hospitals, were included in the analysis). The availability of imatinib 400mg tab was low in all three sectors; imatinib 400mg is newly registered and imatinib 100mg is more commonly used. Of note was the higher availability of originator brands of capecitabine and docetaxel compared to generics in the hospitals sampled. Good availability of letrozole was seen in all three sectors.

Table 21. Availability in the outlets of anticancer medicines by sector

Medicine	Public sector (n=19)			Private sector (n=13)			Other sector (n=2)		
	OB	Generic	Any	OB	Generic	Any	OB	Generic	Any
Capecitabine	36.8%	21.1%	36.8%	38.5%	23.1%	46.2%	100%	50%	100%
Cisplatin	-	89.5%	89.5%	-	53.8%	53.8%	-	100%	100%
Docetaxel	73.7%	68.4%	100.0%	69.2%	38.5%	76.9%	100%	100%	100%
Imatinib	0%	0%	0%	0%	7.7%	7.7%	0%	0%	0%
Letrozole	47.4%	94.7%	100.0%	38.5%	92.3%	100.0%	50%	100%	100%
Vincristine	0%	100.0%	100.0%	0%	61.5%	61.5%	0%	100%	100%
Mean % availability	31.6%	62.3%	71.1%	29.2%	46.2%	57.7%	50.0%	75.0%	83.3%

In Rasht, Khoram and Zahedan, neither of the two tertiary public hospital sampled per city (that dispenses cancer medicines) had capecitabine in stock on the day of the survey (either as the originator brand or a generic). The other cancer medicines

were found in at least one tertiary public hospital per city except imatinib 400mg. In private pharmacies in all cities but Khoramabad, at least one pharmacy of those sampled stocked all the cancer medicines except imatinib. Neither private pharmacy in Khoramabad had capecitabine, cisplatin or vincristine in stock (nor imatinib). The two private pharmacies were in public hospitals in Tehran. Both pharmacies stocked all the cancer medicines, as generics or originator brands, except imatinib.

Prices

Compared to MSH prices, median government procurement prices and patient prices in the three sectors were reasonable for lowest priced generics (Table 21). However, originator brands were 5 times higher priced than these international reference prices in all three sectors.

Table 21. Median MPRs for anticancer medicines

	Procurement prices med MPR (n=2)	Patient prices (med MPR)		
		Public (n=19)	Private (n=13)	Other (n=2)
Originator brand	5.07 (n=3)	5.48 (n=3)	5.48 (n=3)	5.10 (n=3)
Lowest price generic	0.94 (n=6)	1.11 (n=5)	0.81 (n=6)	1.11 (n=5)

The price paid by the Iran Government for the cancer medicines were compared with procurement prices paid by Gulf Cooperation Countries (GCC 2014 tender) and New Zealand (December 2014). GCC prices are generally based on large quantities, although for these cancer medicines the quantities were not available. New Zealand has a small population (4 million people) so quantities are likely to be low, however, in general, prices in New Zealand are thought to be competitive. As shown in Table 22, Iran is paying about 3 times more for OB Capecitabine (Xeloda, Roche) than GCC, and over twice the price for OB Docetaxel (Taxotere, Sanofi) than New Zealand. For lowest priced generics, prices in Iran were lower than GCC prices for the three medicines were prices could be compared (cisplatin, docetaxel and vincristine). Compared to New Zealand, Iranian prices for lowest priced generics were lower for cisplatin, imatinib and vincristine. However, Iranian prices were substantially higher than New Zealand prices for LPG capecitabine (nearly 6 times higher), docetaxel (nearly 7 times higher) and letrozole (2 times higher)

Table 22. Government procurement prices (IR) for anticancer medicines in Iran, GCC and NZ

	Iran IR		GCC IR		New Zealand IR	
	OB	LPG	OB	LPG	OB	LPG
Capecitabine 150mg tab	104545	63800	32235			11100
Cisplatin 50mg vial		192920		292391		332985
Docetaxel 80mg vial	9776385	4583000		6379440	4328805	665748
Imatinib 400mg tab		136363	2551776			442426
Letrozole 2.5mg tab	212174	7131				3552
Vincristine 1mg vial		130435		196965		287699

GCC and NZ prices were converted to IR based on the exchange rate on/9.2014 on Oanda.com
GCC prices were obtained via WHO EMRO from the GCC website; NZ prices were obtained from PHARMAC (http://www.pharmac.health.nz/)

Affordability

The affordability for patients of two of the anticancer medicines, capecitabine and docetaxel, was very poor. A lowest paid worker without insurance would have to pay from 25 to 40 days salary for a month's treatment with capecitabine tablets or docetaxel injection for breast cancer even when buying lowest priced generics (Table 22). Buying originator brands was even more unaffordable. But it should be noted that anticancer medicines are under the coverage of the Special Disease Plan; in public hospitals any patient with cancer who does not have insurance is compulsorily insured by MSIO (Medical Services Insurance Organization) and a one year premium is paid by the Ministry of Health. The patient has to pay 10 percent of the medicines' costs in public hospitals.

Table 22. Affordability of anticancer: number of days' wages to purchase treatments

		Public	Private	Other
Docetaxel 80 mg (for breast cancer 60mg/m^2 every 3 weeks: ~1.2 vial/month)	Brand	46.9	46.9	43.5
	Most sold generic	36.8		
	Lowest Price	31.1	25.2	27.2
Capecitabine 150mg (for breast cancer 1000mg/m^2 daily for 2 weeks: ~160 tab/month)	Brand	68.1	68.1	68.1
	Most sold generic			39.7
	Lowest Price	39.7		39.7
Cisplatin 50mg (for all indications ~100mg/m^2 every 2-3 weeks: ~5vials/month)	Brand			
	Most sold generic	5.8		5.8
	Lowest Price	5.8	5.8	5.8

Vincristine (for all indications ~0.4mg/m^2: ~4 vials/month)	Brand			
	Most sold generic	3.3		3.3
	Lowest Price	3.3	2.2	2.7
Letrozole (for breast cancer 2.5mg daily: 30 tab/month)	Brand	26	27	27
	Most sold generic	1	1	1
	Lowest Price	1	1	1

Recommendations

Based on the findings of this survey, the investigators recommend the following:

- The work of the Pricing Committee should be transparent with clear roles, responsibilities, guidelines etc. and decisions taken should be made public.
- The government should use its negotiating power to obtain lower prices from distributors that can be passed onto patients in the public sector pharmacies.
- All products on the market must be of assured quality. Prices must not be set too low that compromises product quality.
- Prices of imported medicines should be set for a specific period rather than calculated for every shipment.
- The reasons for the low availability of some of the NCD medicines studied should be evaluated. The availability of domestically produced generics must be ensured. When there are stock-outs, the MOH is forced to import medicines as an emergency measure. This can result in higher prices as the products are not subject to price controls.
- Rather than applying fixed mark-ups (as is currently done), distributor and pharmacy mark-ups should be regressive to incentivize the dispensing of lower priced products.
- A dispensing fee should be applied per prescription item rather than per prescription. The level of dispensing fee should be evaluated so that it is commensurate with the work involved in dispensing a medicine but not set so high that it makes medicines unaffordable for those on low wages.
- Consider undertaking an international comparison of government procurement prices for a wider group of cancer medicines to see if prices in Iran are competitive.

ANNEX 1

Iran

MAP OF ADMINISTRATIVE DIVISIONS