Availability and affordability of selected medicines in the Islamic Republic of Iran

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Abstract

Background: There is a standard methodology for measuring and evaluating the availability and affordability of selected medicines in the healthcare system, especially in low- and middle-income countries.

Aim: To investigate availability, affordability and accessibility of medicines in the Islamic Republic of Iran in 2021 and compare the results with those from 2019.

Methods: This descriptive cross-sectional study investigated the availability and affordability of 60 selected medicines in Islamic Republic of Iran. Availability and affordability were measured using the WHO/Health Action International methodology.

Results: The availability rates for originator brands in the public, private and other sectors were 6.4%, 8.6% and 6.8%, respectively. In contrast, availability rates for lowest-priced and most-sold generics were 44.7% and 63.6% in the public sector, 45.4% and 66.4% in the private sector, and 39.6% and 58.6% in other sectors. Only 20.0% of originator brands in the Islamic Republic of Iran were affordable, while 96.6% of the lowest priced and 95.0% of the most sold generics were affordable.

Conclusion: Most medicines in the Islamic Republic of Iran were affordable and the pharmaceutical supply chain was acceptable.

Keywords: essential medicine, availability, affordability, accessibility, generic, originator, private, public, pharmacy, supply chain, Iran

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Introduction

Limited access to essential medicines has been a long-standing problem globally, especially in low- and middle-income countries (*1,2*). Up to 10 million lives could be saved annually by providing access to essential medicines; however, the lack of reliable information on why people do not have such access has prevented policymakers from reforming national policies and solving the problem (*2,3*). Therefore, WHO and Health Action International (HAI) have developed a standard method for assessing the accessibility of medicines, focusing on availability and affordability as key indicators, by countries (*2*).

The Islamic Republic of Iran is a lower-middle-income country with a Gross Domestic Product (GDP) per capita of US$ 4091 and a population of 84.4 million. The country spends 14.0% of its total health expenditure on medicines, which accounts for 6.7% of its GDP (*4–6*). Medicine prices at all levels are determined by the Iran Food and Drug Administration (IFDA) and updated periodically. Patients in public, private and other sectors pay the same amounts and all prices are publicly available on a track, trace and authentication control system created by IFDA (*7*). IFDA monitors and regulates medicine procurement throughout the supply chain, ensuring uniform pricing across all sectors (*6*).

This study evaluated the availability and affordability of 60 selected medicines in the Islamic Republic of Iran. We examined the differences in price, availability and affordability of the medicines in different treatment sectors and regions of the country. We differentiated between originator brands, lowest-priced generics and most-sold generics. The study was designed as a follow-up to a previous study by Heidari et al. in 2019 and to assess the effectiveness of Iranian drug policy (*6,8*).

Methods

Study design

This was a descriptive cross-sectional study that used the standard methodology recommended by WHO/HAI. The methodology specifies a procedure for collecting data and a method for obtaining valid information about medicine accessibility in different countries and regions. This study focused on the availability and affordability of medicines as key indicators in data collection efforts (*9*).

Data collection

We selected 60 medicines for evaluation, along with several provincial centres to represent the geographical spread of the country. In each centre, we selected a specific number of pharmacies from different sectors to collect the data during the first 2 weeks of March 2021, using a standard questionnaire for the different sectors and provincial centres.

Medicines selection

The WHO/HAI standard methodology recommends that the list of medicines should be divided into a global core list and a supplementary list. Our global core list included 14 specific medicines with specific dosage forms determined by WHO. The global list enables comparison between different countries and regions (*9*). Our supplementary list had 46 medicines previously selected for the Islamic Republic of Iran based on an agreement between WHO experts and IFDA in 2014 (*8*). According to the WHO/HAI method, we considered 3 categories (originator brands, lowest-priced generics and most-sold generics) for each medicine. The 60 selected medicines are shown in Table 1.

Selection of collection centres

There are 31 Iranian provinces divided into 5 main regions (central, northern, western, eastern and southern) based on geographical similarities. We randomly selected 2 provinces from each region to cover the geographical extent of the country. Tehran and Hamedan were chosen from the central region, Fars and Kerman from the southern region, Gillan and Alborz from the northern region, Kermanshah and Ahvaz from the western region, and Zahedan and Mashhad form the eastern region.

We extracted a list of all active pharmacies for each province from IFDA and divided them into 3 sectors: (1) public sector: pharmacies directly managed and operated by the government; (2) private sector: pharmacies established and managed by an independent pharmacist; and (3) other sectors: pharmacies located in public hospitals and established by an independent pharmacist, with administration independent of the public sector. In each centre, we chose 5 pharmacies from each sector (public, private and other) randomly using the RAND function in Microsoft Excel (15 pharmacies in each province and 150 pharmacies in total).

Evaluation of affordability

According to WHO/HAI methodology, we determined the affordability index by the number of days of income required for an unskilled government worker receiving the minimum daily wage to cover the cost of medicines for 1 month (for medicines taken over a long period) or 1 course of treatment (for medicines used for a limited and specific time) (*9*). The monthly amount that the patient paid for their medicine was calculated. In cases where some medicines, such as antibiotics, had a

Table 1. Number of days' wages required by unskilled government worker to provide 1 course or 1 month's treatment

Medicine	Global/supplementary list	No. of units consumed per month	No. of days' wages to be paid		
			Originator brands	Lowest-priced generics	Most-sold generics
Acetaminophen 120 mg/5 ml	Global list	1	–	0.13	0.13
Amitriptyline 25 mg	Global list	30	–	0.06	0.06
Amoxicillin 500 mg	Global list	42	–	0.33	0.33
Atenolol 80 mg	Global list	30	–	0.05	0.05
Captopril 25 mg	Global list	90	–	0.2	0.2
Ceftriaxone 1 g	Global list	3	–	0.3	0.3
Ciprofloxacin 500 mg	Global list	14	–	0.1	0.1
Cotrimoxazole 200+40/5 ml	Global list	1	–	0.07	0.07
Diazepam 5 mg	Global list	30	–	0.04	0.04
Diclofenac 50 mg	Global list	90	3.3	0.12	0.12
Glibenclamide 5 mg	Global list	30	0.1	0.04	0.04
Omeprazole 20 mg	Global list	30	–	0.1	0.1
Salbutamol inhaler	Global list	1	–	0.3	0.3
Simvastatin 20 mg	Global list	30	–	0.1	0.1
Aspirin 80 mg	Supplementary list	30	–	0.05	0.05
Alprazolam 0.5 mg	Supplementary list	30	0.14	0.05	0.05
Amlodipine 5 mg	Supplementary list	30	–	0.05	0.08
Atorvastatin 10 mg	Supplementary list	30	–	0.07	0.07
Beclomethasone inhaler	Supplementary list	1	0.12	0.1	0.1
Carbamazepine 200 mg	Supplementary list	30	0.67	0.2	0.2

Table 1. **concluded**

Medicine	Global/supplementary list	No. of units consumed per month	No. of days' wages to be paid		
			Originator brands	Lowest-priced generics	Most-sold generics
Carvedilol 6.25 mg	Supplementary list	60	–	0.5	0.5
Cetirizine 10 mg	Supplementary list	30	0.05	0.05	0.07
Chlorpromazine 100 mg	Supplementary list	1	–	0.01	0.01
Clopidogrel 75mg	Supplementary list	30	2.51	0.4	0.5
Clozapine 100 mg	Supplementary list	30	–	0.25	0.25
Dexamethasone 8 mg/ml	Supplementary list	2	–	0.05	0.05
Digoxin 0.25 mg	Supplementary list	30	0.05	0.06	0.06
Dimenhydrinate 50 mg	Supplementary list	8	–	0.01	0.01
Enalapril 5 mg	Supplementary list	30	–	0.05	0.05
Enoxaparin 4000 IU/0.4 ml	Supplementary list	21	–	14.7	14.7
Epinephrine 0.1 mg/ml	Supplementary list	1	1.39	0.02	0.02
Epoetin alpha	Supplementary list	12	–	5	5
Fluoxetine 10	Supplementary list	30	–	0.1	0.1
Fluphenazine 25 mg/ml	Supplementary list	2	0.06	0.3	0.3
Folic acid 1 mg	Supplementary list	30	–	0.04	0.04
Furosemide 40 mg	Supplementary list	30	–	0.05	0.05
Gliclazide 80 mg	Supplementary list	30	–	0.17	0.2
Human insulin	Supplementary list	2	–		
Hydrochlorothiazide 25 mg	Supplementary list	30	–	0.04	0.04
Hydrocortisone 100 mg	Supplementary list	2	0.25	0.1	0.1
Ibuprofen 400 mg	Supplementary list	90	0.7	0.3	1.3
Isophane insulin	Supplementary list	2	–	0.3	0.3
Isosorbide dinitrate 10 mg	Supplementary list	90	–	0.2	0.2
Levodopa/carbidopa 250/25 mg	Supplementary list	60	1.08	0.86	0.86
Levothyroxine 100 mg	Supplementary list	30	0.35	0.1	0.1
Lithium carbonate 300 mg	Supplementary list	90	–	0.9	0.9
Losartan 50 mg	Supplementary list	30	–	0.12	0.12
Metformin 500 mg	Supplementary list	90	1.2	0.2	0.2
Methylphenidate 10 mg	Supplementary list	30	0.16	0.15	0.15
Morphine sulfate	Supplementary list	1	–	0.02	0.02
Phenobarbital 100 mg	Supplementary list	30	–	0.1	0.1
Phenytoin 100 mg	Supplementary list	30	–	0.2	0.2
Prednisolone 5 mg	Supplementary list	30	–	0.07	0.07
Salbutamol 2 mg/5 ml	Supplementary list	2	–	0.15	0.15
Sodium valproate 500 mg	Supplementary list	30	0.81	0.16	0.2
Spironolactone 100 mg	Supplementary list	30	–	0.6	0.6
Sulfasalazine 500 mg	Supplementary list	90	–	0.8	0.8
Tamoxifen 20 mg	Supplementary list	60	–	0.3	0.3
Timolol 0.5%	Supplementary list	1	–	0.04	0.04
Trihexyphenidyl 2 mg	Supplementary list	30	–	0.05	0.05

standard treatment course, then 1 treatment course was considered. The daily wage of the lowest-paid unskilled government worker was considered, which was US$ 2.83 in March 2021, according to government labour rules (*10*). The affordability index was calculated by dividing the minimum daily wage by the cost of the medicine. If providing a specific medicine for 30 days of treatment required > 1 day's income for an unskilled worker, it was classified as unaffordable (*8,9*).

Evaluation of availability

We evaluated the availability index based on the percentage availability of medicines in different sectors or provincial centres. Less than 30.0% availability was considered very low, 30.0–49.0% low, 50.0–80.0% fairly high, and > 80.0% as high (*8*,*9*).

Results

Affordability

The income corresponding to a specific number of days that an unskilled worker must spend to provide medicine for 1 month of treatment is shown in Table 1. Forty-three medicines among 60 originator brands, equivalent to 71.7% of the list, no longer had import licenses and were not in the Iranian pharmaceutical market, according to the pharmaceutical consumption report of 2021 (*11*). Most lowest-priced generics (96.6%) and most-sold generics (95.0%) were affordable based on the above definition. Twenty percent of the originator brands were affordable, 8.3% were unaffordable and the remaining 71.7% were not on the Iranian drug list (*12*).

Availability

Public sector

Seventeen originator brands were still available in all cities, according to the pharmaceutical consumption report (2021), and an average of 6.4% of the originator brands were available through the public sector across the country (*13*). Less than half the lowest-priced generics (44.7%) were available in all 50 public pharmacies nationwide. The highest percentage of lowest-priced generics (52.3%) was in the Tehran public sector and the lowest (34.7%) in Shiraz (Figure 1). Most of the most-sold generics (63.6%) were available in the public sector nationwide. Among the public pharmacies, Tehran had the highest number (73.7%) and Zahedan had the lowest (53.0%).

Private sector

There were 8.6% of OBs available in the private sector. Shiraz had the highest proportion, accounting for 14.0%, while Hamadan had the lowest (5.0%). Among the 60 selected medicines, in the private sector, on average, 45.4% of lowest-priced generics were available. Among the provincial centres, Kerman had the highest proportion (54.3%), and Hamedan had the lowest (33.3%). Most most-sold generics (66.4%) were available in the private sector. Among the different cities, Hamedan had the highest proportion (71.7%), and Zahedan the lowest (54.3%) (Figure 2).

Other sectors

The 17 originator brands investigated in other sectors had 6.8% mean availability. The highest number was in Kermanshah (10.4%), and the lowest in Zahedan (3.3%).Less than 50.0% of lowest-priced generics (39.6%) were available in other sectors. Among the provinces, Kermanshah had the highest proportion (49.1%), and Zahedan the lowest (26.3%). On average, 58.6% of most-sold generics were found in other sectors. The pharmacies in Tehran and Hamedan provinces had the

Figure 1. Percentage availability of medicines in the public sector (pharmacies managed by government)

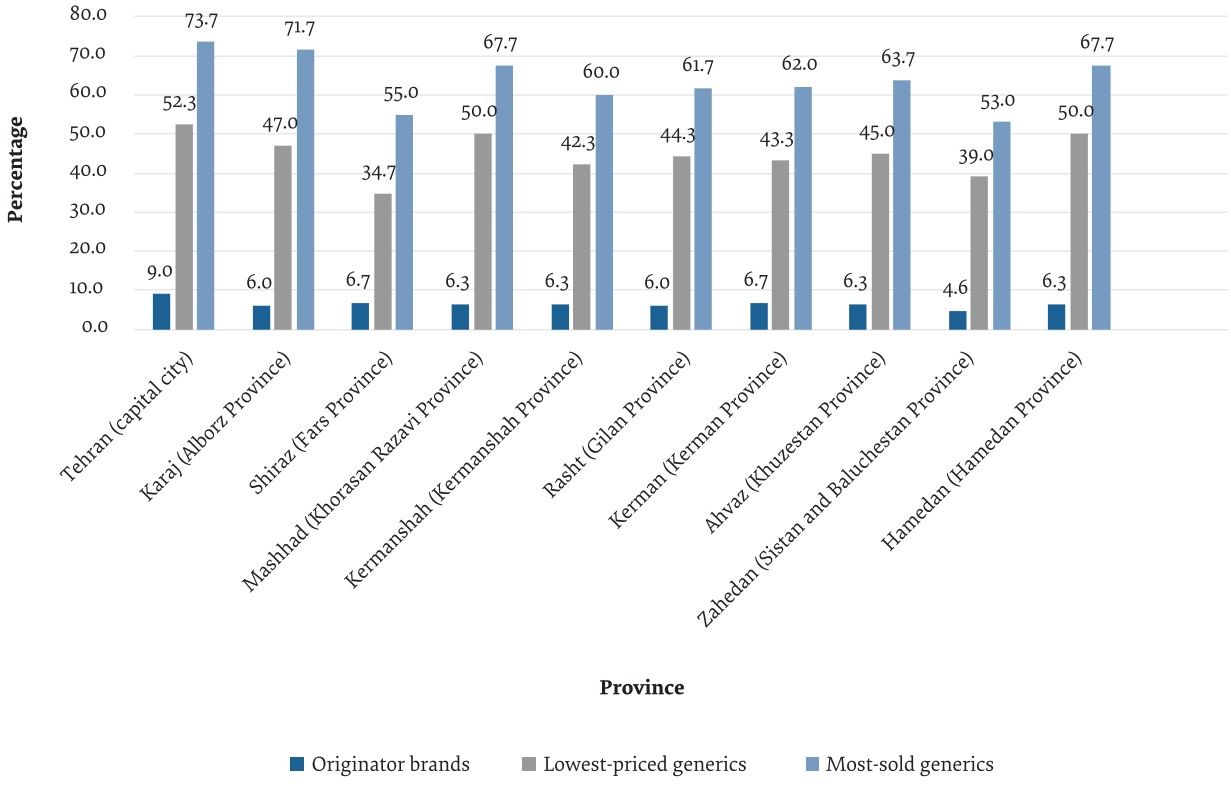

Figure 2. Percentage availability of medicines in the private sector (pharmacies managed by an independent founder)

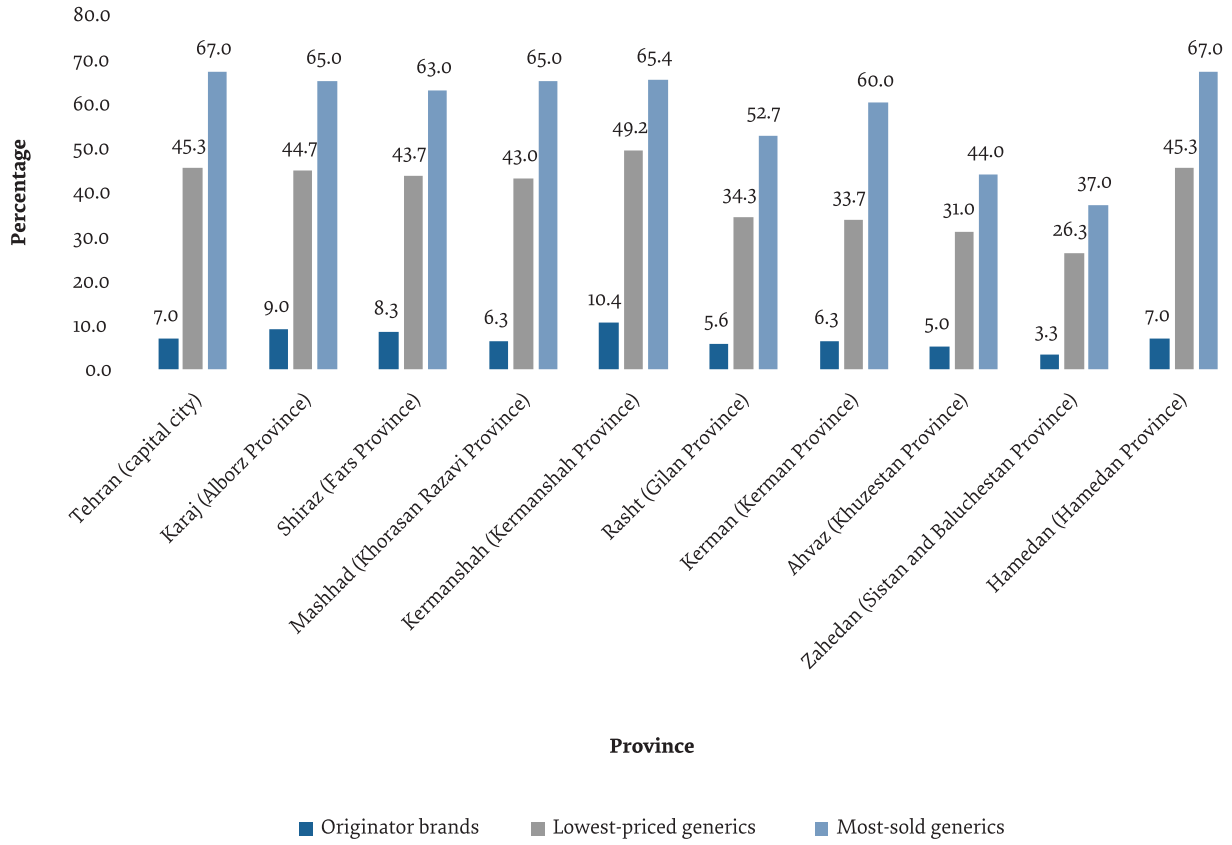

Figure 3. Percentage availability of medicines in other sectors (pharmacies located in public hospitals but managed by an independent founder)

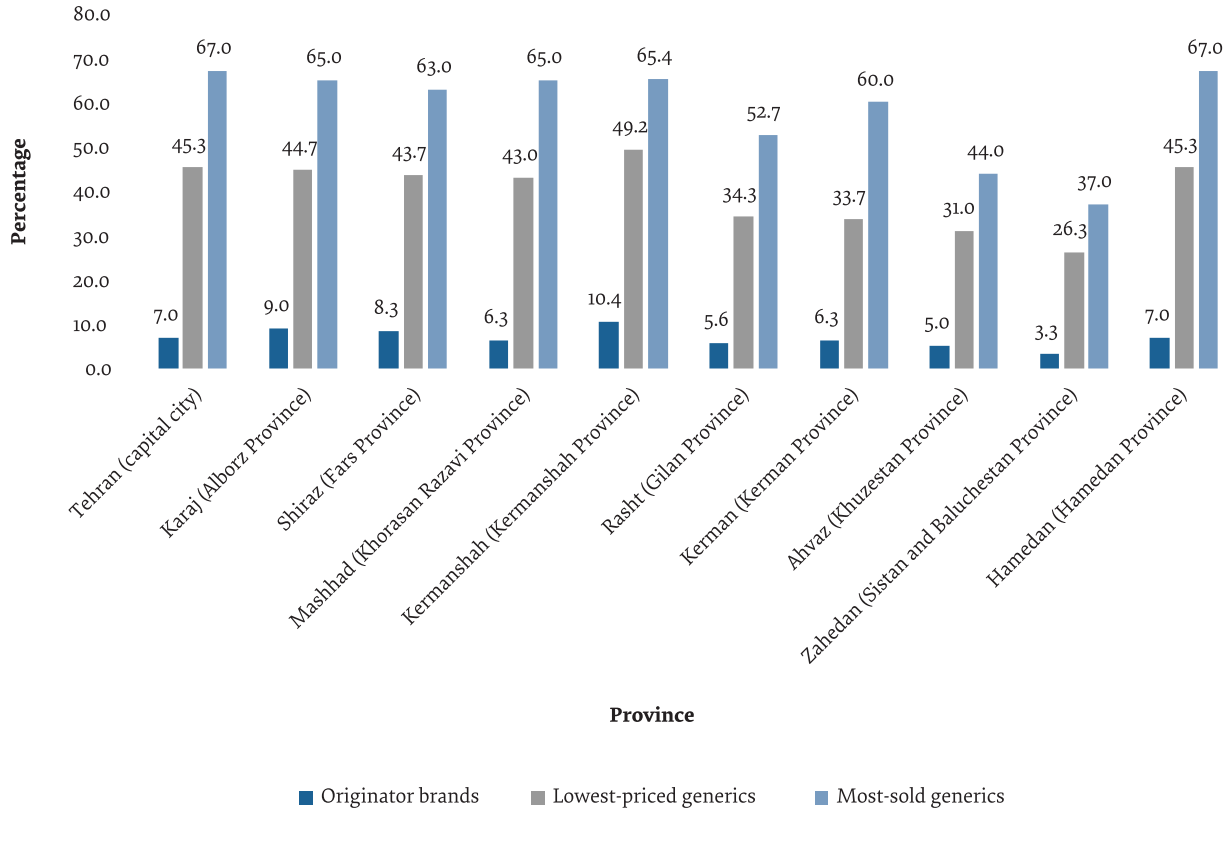

Table 2. Comparison of mean availability of medicines with that of Heidari et al. (2019)

	Originator brands	Lowest-priced generics	Most-sold generics
Public sector			
Mean availability in 2014 (%)	25.0	46.4	75.5
Mean availability in 2021 (%)	6.4	44.7	63.6
Private sector			
Mean availability in 2014 (%)	39.1	53.3	83.3
Mean availability in 2021 (%)	8.6	45.4	66.4
Other sectors			
Mean availability in 2014 (%)	24.8	50.6	80.3
Mean availability in 2021 (%)	6.8	39.6	58.6
Total			
Mean availability in 2014 (%)	29.6	50.1	79.7
Mean availability in 2021 (%)	7.3	43.2	62.9

Heidari et al. conducted in 2014 and published in 2019

highest proportion, with an average of 67.0% of most-sold generics, and Zahedan Province, with an average of 37.0%, had the lowest (Figure 3).

Heidari et al. used a methodology identical to ours, and 1 of the primary objectives of our research was to compare the data from these 2 studies (Table 2). The aim was to identify potential differences between the 2 periods and identify any improvements that may have occurred (*8*).

Discussion

This study was conducted in the Islamic Republic of Iran in March 2021 to determine the availability of 60 medicines in 10 different provincial centres, as well as public, private and other sectors, using the standard method recommended by WHO/HAI (9). The study also examined was the affordability of originator brands, lowest-priced generics and most-sold generics of the selected medicines.

Among selected medicines on both the global and supplementary lists, generic medicines had good availability and affordability, although availability of generics decreased marginally in comparison with the 2019 study by Heidari et al. (*8*). The mean availability of lowest-priced generics was low (< 50.0%) and that of most-sold generics was higher (50.0%–80.0%) in all sectors. However, originator brands availability was very low (< 10.0%).

According to IFDA policies, if a generic medicine has a domestic reliable manufacturer, import licenses should not be issued for foreign brands (*14*). To mitigate the impact of higher costs for originator brands, address challenges associated with currency exchange due to sanctions, and promote domestic production, preference has been granted to domestic producers (*15*). According to the pharmaceutical consumption report published in 2021 by IFDA, 98.5% of the Iranian pharmaceutical market volume and 87.0% of the market value were supplied by domestic producers (*11*). In the pharmaceutical consumption report of 2017, domestic producers had supplied 95.7% of the market volume and 67.8% of the market value (*16*). Over time, more medicines have been produced domestically. Based on the policies, the decline in mean availability of originator brands is reasonable (*11*). Table 2 shows that the mean availability of originator brands and generics decreased in 2021 compared with 2014 (*8*). A study in 2015 reported that a high proportion of patients trusted generic medicines produced in the Islamic Republic of Iran and there was no reliable evidence to show that domestically produced generics lacked the necessary quality (*17,18*). However, some patients and physicians have doubts about the quality of domestically produced drugs and prefer to use originator brands. The Iranian national policies on medicine and support for domestic production have caused some dissatisfaction among consumers (*19*).

The affordability index for generics and originator brands showed that all lowest-priced generics (except enoxaparin) and most of the most-sold generics (except enoxaparin and ibuprofen) were affordable. Monthly treatment for 5 originator brands (clopidogrel, epinephrine, levodopa/carbidopa, metformin and diclofenac) cost equivalent to the earnings of < 1 day. It should be noted that prices did not vary across the 3 sectors according to central pricing. IFDA national policies have resulted in acceptable access to the selected medicines, while access to the main medicines remains desirable. Medicines were mostly affordable and available in the pharmacies of the different sectors, although the private sector had higher availability than the public and other sectors, and most-sold generics were the most available type of medicines.

Comparison between this study and that of Heidari et al. (2019) showed that the mean availability of generics (both lowest-priced generics and most-sold generics) has decreased. The mean availability of lowest-priced generics was 50.1% in 2014 and decreased to 43.2% in

this present study. The mean availability for most-sold generics decreased from 79.7% in 2014 to 62.9% in 2021. The affordability index decreased between 2014 and 2021 (except for metformin and diclofenac originator brands). The change in medicine production costs between 2017 and 2021 has been investigated (*20*). There was no direct link between the increase in production costs (215.0%) and the increase in the price of medicines (111.0%). The authors concluded that the decrease in producers' profits resulted in decreased motivation to produce the medicines in question.

Compared with countries with similar GDP per capita that had conducted similar studies with the standard WHO/HAI methodology, the Islamic Republic of Iran had a favourable situation, especially for generics. A study was conducted in 2017 in Pakistan using the standard methodology and 50 essential medicines (*21*). Pakistan had better mean availability of originator brands in the private sector (55.0%), but the mean availability of lowest-priced generics was 35.3% in the public sector and 20.3% in the private sector. Nearly half (53.0%) of originator brands and 38.0% of lowest-priced generics were unaffordable. In a study in 2020 in the Philippines of 50 essential medicines, public sector mean availability was 1.3% for originator brands and 25.0% for lowest-priced generics (*22*). For the private sector, availability was 34.7% for originator brands and 35.4% for lowest-priced generics. In comparison, the Islamic Republic of Iran had a more restricted market for originator brands than the other 2 countries, but had better mean availability of generics.

Our study had some limitations. Firstly, availability was measured only on the day of data collection, which may not represent availability over time. Secondly, alternative dosage forms and strengths were not considered. Lastly, the affordability measure did not include all potential healthcare costs, such as diagnostic tests.

Conclusion

We collected data on the availability and affordability of 60 essential medicines across private, public and other sectors in 10 provincial centres in the Islamic Republic of Iran, using the WHO/HAI standard methodology. The availability index for generics in all sectors and provinces was acceptable, but for originator brands, the index was very low in all sectors and cities. Affordability was good, and most of the 60 medicines were affordable. Policymakers could use these results to assess and modify current policies and prices.

Disponibilité et accessibilité économique de certains médicaments en République islamique d'Iran

Résumé

Contexte : Il existe une méthodologie standardisée qui permet de mesurer et d'évaluer la disponibilité et l'accessibilité économique de certains médicaments dans le système de santé, en particulier dans les pays à revenu faible ou intermédiaire.

Objectifs : Étudier la disponibilité, l'accessibilité économique des médicaments et la facilité à s'en procurer en République islamique d'Iran en 2021 et comparer les résultats obtenus avec ceux de 2019.

Méthodes : La présente étude transversale descriptive a examiné la disponibilité et l'accessibilité économique de 60 médicaments sélectionnés en République islamique d'Iran. Celles-ci ont été mesurées à l'aide de la méthodologie établie par l'Organisation mondiale de la Santé et Health Action International.

Résultats : Les taux de disponibilité des médicaments de marque d'origine dans les secteurs public, privé et autres étaient respectivement de 6,4 %, 8,6 % et 6,8 %. En revanche, les taux de disponibilité pour les médicaments génériques les moins chers et les plus vendus étaient de 44,7 % et 63,6 % dans le secteur public, de 45,4 % et 66,4 % dans le secteur privé, et de 39,6 % et 58,6 % dans les autres secteurs. Seuls 20,0 % des médicaments de marque d'origine vendus dans le pays étaient abordables, tandis que 96,6 % des génériques les moins chers et 95,0 % des plus vendus l'étaient.

Conclusion : La plupart des médicaments en République islamique d'Iran sont abordables et la chaîne d'approvisionnement pharmaceutique est adéquate.

توافر عدد من الأدوية المحددة والقدرة على تحمل تكاليفها في جمهورية إيران الإسلامية

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الخلاصة

الخلفية: قياس وتقييم توافر الأدوية المحددة والقدرة على تحمُّل تكاليفها في نظام الرعاية الصحية له منهجية موحدة، لا سيما في البلدان ذات الدخل المنخفض والمتوسط.

الأهداف: هدفت هذه الدراسة الى تقصي مدى توافر واتاحة الأدوية والقدرة على تحمُّل تكاليفها في جمهورية إيران الإسلامية في عام 2021، ومقارنة النتائج بنتائج عام 2019.

طرق البحث: استقصت هذه الدراسة الوصفية المقطعية مدى توافر 60 دواءً محددًا، والقدرة على تحمُّل تكاليفها في جمهورية إيران الإسلامية. كما قِيسَ مدى التوافر والقدرة على تحمُّل التكاليف باستخدام "منهجية منظمة الصحة العالمية والمنظمة الدولية للعمل في مجال الصحة".

النتائج: بلغت معدلات توافر العلامات التجارية الأصلية في القطاع العام والقطاع الخاص والقطاعات الأخرى 6.4٪ و8.6٪ و6.8٪ على الترتيب. وفي المقابل، بلغت معدلات توافر الأدوية الجنيسة الأقل سعرًا والأدوية الجنيسة الأكثر مبيعًا 44.7٪ و63.6٪ في القطاع العام، و45.4٪ و66.4٪ في القطاع الخاص، و39.6٪ و58.6٪ في القطاعات الأخرى. وكانت 20.0٪ فقط من العلامات التجارية الأصلية في جمهورية إيران الإسلامية ميسورة التكلفة، في حين أن 96.6٪ من الأدوية الجنيسة الأقل سعرًا، و95.0٪ من الأدوية الجنيسة الأكثر مبيعًا كانت ميسورة التكلفة.
الاستنتاجات: تبيَّن أن معظم الأدوية في جمهورية إيران الإسلامية ميسورة التكلفة، وأن سلسلة الإمداد الصيدلاني مقبولة.

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