



## Access to medicines: looking for policy and finding corruption

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GJMEDPH 2014; Vol. 3, issue 1

### ABSTRACT

The analysis aimed to determine whether countries with indicators of robust national drug policy also have good access to medicines, suggesting that policy has a positive effect. The authors also looked into other determinants of the variation in access to medicines across the countries. The study exploited massive data sets from World Health Organization, Health Action International, Transparency International and the World Bank. A sample of 37 low- and middle-income countries was chosen for the analysis. Multiple linear regression was used to examine the association of access to medicines with national drug policy and externality variables of governance including corruption. No relationship was found between national drug policy and access to medicines in the public sector. However, this study did find a relationship between one of the governance indicators, control of corruption, and two important variables of access to medicines: generic medicines price and availability in the public sector.

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Funding: none  
Conflicts of interest: none

**KEYWORDS:** National drug policy, access to medicine, essential medicines, corruption, low- and middle-income countries, generics, pharmaceutical sector

### INTRODUCTION

It has been over 35 years since the World Health Assembly introduced the concepts of "essential medicines" and "national drug policy". In 1977, World Health Organization (WHO) developed a Model List of Essential Medicines, and in 1978 the Declaration of Alma-Ata recognized the "provision of essential medicines and vaccines" as a major component of primary health care. These concepts were accepted and adopted globally as a powerful means to promote health equity.

However, the situation today looks grim. In 2011 around 10 million deaths were attributed to diseases and pathological conditions that can be prevented or cured when inexpensive and safe medicines are equitably accessible<sup>1,2</sup>. In low- and middle-income countries, patients spend up to 70% of their overall health spending for medicines, compared to 10-18% in the developed world. Expenditures for medicines are out-of-pocket purchases, making medicines the largest family expenditure after food<sup>3</sup>. Price markups are as high as 25-fold over international reference prices in

some low-income countries<sup>4,5</sup>. Essential medicines in many low- and middle-income countries are inaccessible to poor and vulnerable people<sup>6</sup>.

National Drug Policies (NDPs) have been established in 140 countries with the support of the World Health Organization, on the assumption that well-designed policies will contribute to improved access to medicines. Although concerns about the effectiveness of national drug policies have been raised in individual countries<sup>7-9</sup>, until now there has been no comprehensive multi-country study that looks into impact of NDPs on access to existing off-patent originator brand and generic drugs. National drug policy should establish procedures and implementation processes within country's pharmaceutical sectors, which assure equitable and sustainable access, quality and rational use of medicines with priority on the public sector. With this perspective, NDPs in 37 low- and middle-income countries were analyzed using key indicators identified by the WHO. The analysis also aimed to identify relationships with other determinants of the variation in access to

medicines across countries such as governance indicators.

## MATERIALS AND METHODS

### Data and Sources

The data used in this analysis were obtained from 3 different sources. Data on access to medicines for year 2003 to 2008 were abstracted from the surveys conducted by WHO and Health Action International (HAI)<sup>10</sup>. These data are publicly available online. The data for national drug policies were obtained from the periodic surveys of pharmaceutical situation in 140 countries with permission from

WHO's Department of Essential Medicines and Pharmaceutical Policy<sup>11,12</sup>. 37 low- and middle-income countries provided complete data for both the independent variables on status of NDPs and dependent variables on access to medicine (Table 1). For countries reporting sub-national data, results were averaged without weighting. In addition, we obtained the data for governance from the publicly available World Bank's Worldwide Governance Indicators Project and Transparency International's annual Corruption Perceptions Index.

**Table 1. Country Surveys Included in the Secondary Analysis**

Countries	WHO Region	World Bank income group (2008)
Bolivia (October, 2007)	Americas	Lower-middle
Brazil, Rio de Janeiro State (October, 2001)	Americas	Upper-middle
Cameroon (May, 2002)	Africa	Lower-middle
Chad (May, 2004)	Africa	Low
China, Shandong Province (October, 2004)	Western Pacific	Lower-middle
China, Shanghai Province (September, 2004)	Western Pacific	Lower-middle
Colombia (October, 2008)	Americas	Upper-middle
Congo (June, 2007)	Africa	Lower-middle
Ecuador (September 2008)	Americas	Lower-middle
El Salvador (November, 2006)	Americas	Lower-middle
Ethiopia (September, 2004)	Africa	Low
Ghana (October, 2004)	Africa	Low
India, Chennai State (January, 2004)	South East Asia	Lower-middle
India, Haryana State (October, 2004)	South East Asia	Lower-middle
India, Karnataka State (November, 2004)	South East Asia	Lower-middle
India, Maharashtra State, 12 districts (October, 2004)	South East Asia	Lower-middle
India, Maharashtra State, 4 regions (January, 2005)	South East Asia	Lower-middle
India, Rajasthan State (June, 2003)	South East Asia	Lower-middle
India, West Bengal State (December, 2004)	South East Asia	Lower-middle
Indonesia (August, 2004)	South East Asia	Lower-middle
Islamic Republic of Iran (December, 2007)	Eastern Mediterranean	Lower-middle
Jordan (May, 2004)	Eastern Mediterranean	Lower-middle
Kenya (November, 2004)	Africa	Low
Kyrgyzstan (February, 2005)	Europe	Low
Malaysia (October, 2004)	Western Pacific	Upper-middle
Mali (March, 2004)	Africa	Low
Mauritius (August, 2008)	Africa	Upper-middle
Mongolia (November, 2004)	Western Pacific	Lower-middle
Morocco (April, 2004)	Eastern Mediterranean	Lower-middle
Nicaragua (October, 2008)	Americas	Lower-middle
Nigeria (September, 2006)	Africa	Low

Oman (October, 2007)	Eastern Mediterranean	High
Pakistan (July, 2004)	Eastern Mediterranean	Lower-middle
Peru (September, 2005)	Americas	Upper-middle
Philippines (February, 2005)	Western Pacific	Lower-middle
Sao Tomé en Príncipe (June, 2008)	Africa	Lower-middle
South Africa, Kwazulu Natal State (September, 2001)	Africa	Upper-middle
Sudan, Gadarif State (February, 2006)	Eastern Mediterranean	Lower-middle
Sudan, Kordofan State (February, 2006)	Eastern Mediterranean	Lower-middle
Sudan, Khartoum State (June, 2005)	Eastern Mediterranean	Lower-middle
Syrian Arab Republic (December, 2003)	Eastern Mediterranean	Lower-middle
Tajikistan (February, 2005)	Europe	Low
Thailand (October, 2006)	South East Asia	Lower-middle
Tunisia (March, 2004)	Eastern Mediterranean	Lower-middle
Uganda (April, 2004)	Africa	Low
United Republic of Tanzania (September, 2004)	Africa	Low

### ***Development of indicators for access to medicines***

Access to medicines as defined by WHO/HAI is comprised of price, availability and affordability dimensions<sup>2,13,14</sup>. Affordability, defined as the number of days' wages of the lowest-paid unskilled worker needed to purchase courses of treatment for selected common conditions was not included in this study as it did not add information to that found for analysis of prices. The processes in estimating price and availability measurements are described below.

A basket of 10 medicines was chosen from the WHO/HAI database to facilitate a comparison between countries. Medicines were included in the basket based on their availability in most or all country surveys. Data were used from all available HAI/WHO country surveys on medicine prices and availability conducted from 2003-2008. Medicine price was represented as median price ratio (MPR) or the ratio of a medicine's median local unit price (e.g. tablet, milliliter, vial, and dose for an inhaler) across outlets to the Management Sciences for Health (MSH) median international reference price for the year preceding the survey. Year 2004 (referenced to MSH 2003 international reference prices) was chosen as a baseline year as most of the surveys have been conducted that year. For all other surveys done in another year, public and private sector medicine patient prices were adjusted according to the methods described in the manual "Measuring medicine prices, availability, affordability, and price components"<sup>2</sup>. Availability,

defined as the percentage of medicine outlets where a medicine was located on the day of the survey, was derived by averaging the set of percentage availability values of medicines in the basket.

### ***Development of national drug policy index (NDP index)***

WHO recommends that nation states include at least 6 key components in their NDPs (selection of medicines, affordability, financing, supply, regulation and quality, and rational use)<sup>15</sup>. However, for the purpose of this study only the components that are fundamental for access to medicines objectives were extracted from WHO pharmaceutical situation assessment.

These component indicators and their sub-indicators were then used to build a national drug policy index (NDP index). Eight major domain indicators - document status, monitoring, medicine selection, supply system, finance system, production, regulatory quality and human resources with their sub indicators were used to generate final index scores (range 0 to 100) for each country. Building this NDP index involved several steps requiring complex methodological choices such as using the fitness-for-purpose criteria in terms of investigator needs to select and aggregate variables from massive collection of WHO pharmaceutical situation assessment data, as a first step (Table 2). All 140 countries' data was used without restricting to 37 countries. Cold deck

imputation and multiple imputation were carried out to treat the minimal missing values<sup>16</sup>. Different values of indicators were normalized onto a common scale of 0 to 1, and employed in weighting and unifying the values of pharmaceutical policy assessment of each country<sup>17</sup>. In other words, summing the scores given to a country over all indicators in a given domain yields the domain score; summing the domain scores yields the

country's overall NDP index score. This additive aggregation or linear summation of weighted and normalized indicators is the most commonly used technique<sup>18</sup>. Its advantages are simplicity and relative indifference to outliers. Due to the lack of information on the relative importance of various policy indicators for access to medicines, equal weights on all sub-indicators were applied.

**Table 2. Descriptive Statistics of the Data Used**

Dependent variables	N	Min	Max	Mean	SD
LPG public patient price (US Dollar/tablet)	36	0.00	1.21	0.43	0.38
LPG private patient price (US \$/tablet)	37	0.26	1.73	0.88	0.37
OB private patient price (US Dollar/tablet)	35	0.51	2.23	1.42	0.41
LPG public availability (%)	36	3.52	98.34	45.97	22.90
LPG private availability (%)	36	14.30	97.70	63.70	20.48
OB public availability (%)	36	0.00	1.50	0.48	0.52
OB private availability (%)	36	14.30	97.70	63.70	20.48
Independent variables	N	Min	Max	Mean	SD
National Drug Policy Index (ranking scores)*	37	21.22	37.95	29.49	4.61
NDP document status (ranking scores)	37	0.00	4.83	3.12	1.14
Monitoring system (ranking scores)	37	0.00	1.38	0.86	0.57
Selection of medicines (ranking scores)	37	0.69	3.45	2.31	0.55
Supply system (ranking scores)	37	2.07	8.28	4.92	1.60
Finance system (ranking scores)	37	0.17	12.08	6.68	2.64
Production system (ranking scores)	37	0.00	2.76	1.64	0.68
Regulatory system (ranking scores)	37	4.14	8.28	6.62	1.22
Human resources (ranking scores)	37	0.00	6.21	3.34	1.77
Control of corruption (ranking scores)*	37	69.00	69.00	37.81	19.07
Voice and accountability (ranking scores)*	37	6.00	75.00	35.60	18.90

### **Validity of NDP index - Sensitivity analysis**

The methodological choices and assumptions inherent during development of the index such as imputation treatment given to missing data and the choice of weighting scheme used can heavily influence the nature of main message expressed by the index, therefore, the robustness of the national drug policy index was further assessed by sensitivity analysis<sup>19</sup>. Seven indexes, generated using different scenarios, were found to be highly correlated, with correlation coefficients ranging from 0.74 to 0.95. This indicates missing data treatment did not influence the index and more importantly, the weighting scheme used (no matter which components get the greater weight) does not matter very much in terms of NDP index representing the overall national drug policies of

countries.

### **Externality indicators**

Worldwide Governance Indicators (WGI) on 6 dimensions of governance (voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption) were extracted from World Bank database for all 37 countries to be used as externality factors<sup>20</sup>. Countries' rankings for perception of corruption were available from Transparency International's annual Corruption Perceptions Index (CPI); thus there were two sources of data on corruption<sup>21</sup>.

### **Statistical Analysis**

Associations of access to medicines with NDP index

and external factors (control of corruption and voice and accountability) were analyzed by multiple linear regression. Due to high correlation ( $r \geq .7$ ) found among worldwide governance indicators (WGI) and Corruption Perception Index (CPI), CPI and four WGI variables (government effectiveness, political stability, regulatory quality, and rule of law) were excluded from further analysis with a correlation coefficient cut-off point of 0.70. In the initial analysis, a series of multiple regression models for a single NDP index and externality factors, listed in Table 2, were estimated for the indicators of access to medicines. Each of the eight individual NDP components making up the NDP Index was then evaluated by multiple regression with the same external factors against the independent access to medicines variables. Multiple regression analysis of individual NDP

components did not show any consistent relationships with price or availability of medicines and are not presented here (see additional files online). All models were examined for goodness of fit and no violation of linearity assumption was observed. All analyses were done using Statistical Package for the Social Science (SPSS) version 17.0<sup>22</sup>.

## RESULTS

Descriptive statistics are shown for dependent and independent variables in Table 2. The study began with seven dependent and eleven independent variables, with three independent variables surviving after elimination of variables showing high correlation with the remaining variables (i.e., contributing no additional information in the analysis

**Table 3. Price and Availability Range of Medicines in the Public and Private Sectors**

No.	Country	Price <sup>1</sup> and availability <sup>2</sup> range of private sector basket of medicines			
		LPG <sup>3</sup> patient price	OB <sup>4</sup> patient price	LPG <sup>3</sup> availability	OB <sup>4</sup> availability
1	Bolivia	1.88 -13.03	n/a	0% - 96.70%	0% - 10.00%
2	Brazil	5.99 - 29.19	6.4 - 168.41	66.70% -90%	20% - 93.30%
3	Cameroon	2.36 - 33.28	2.6 - 103.51	0% - 95%	0% - 100%
4	Chad	15.31	3.32 - 47.17	0% - 45.50%	0% - 81.80%
5	China	0.79 - 5.83	2.75 - 26.46	0% - 70%	0% - 85%
6	Colombia	1.48 - 10.05	5.52 - 218.32	11.90% - 100%	10.20% - 59.30%
7	Congo	3.85 - 28.58	3.01 - 43.55	0% - 70.80%	0% - 83.30%
8	Ecuador	3.2 - 18.49	5.5 - 121.95	6.7% - 100%	13.30% - 96.70%
9	El Salvador	4.23 - 72.1	4.89 - 134.96	50% - 96.20%	13.50% - 82.70%
10	Ethiopia	1.07 - 4.57	2.39 - 32.45	60% - 100%	0% - 52%
11	Ghana	1.03 - 7.05	4.34 - 49.24	28.60% - 85.70%	0% - 44.60%
12	India	.98 - 4.4	0.98 - 5.73	26.08% - 95.93%	9.47% - 77.10%
13	Indonesia	1.71 - 20.44	4.99 - 90.08	0% - 98.30%	0% - 75.90%
14	Iran	0.81 - 2.32	n/a	96.70% - 100%	0% - 10%
15	Jordan	1.1 - 22.06	2.6 - 100.32	60% - 95%	0% - 80%
16	Kenya	1.25 - 12	2.85 - 140.07	60.30% - 87.90%	22.40% -74.10%
17	Kyrgyzstan	0.48 - 6.75	1.82 - 18.05	10% - 100%	0% - 50%
18	Malaysia	1.48 - 16.46	2.7 - 111.63	0% - 96.90%	0% - 90.60%
19	Mali	2.22 - 21.03	3.49 - 53.77	30% - 85%	0% - 70%
20	Mauritius	1.61 - 19.27	1.84 - 53.1	16.70% - 100%	0% - 96.70%
21	Mongolia	1.2 - 8.63	n/a	4% - 100%	4%
22	Morocco	2.82 - 82.76	3.27 - 130.36	0% - 100%	0% - 100%
23	Nicaragua	2.99 - 11.24	21 - 93.88	51.60% - 100%	9.70% - 41.90%
24	Nigeria	1.89 - 18.34	2.33 - 50.53	0% - 93.20%	0% - 84.10%
25	Oman	1.81 - 35.96	7.29 - 128.69	0% - 93.80%	0% - 90.60%
26	Pakistan	0.72 - 7.02	0.72 - 26.2	2.10% - 81.30%	14.60% - 95.80%
27	Peru	0.67 - 25.37	4.14 - 143.56	18.8% - 100%	12.50% - 81.30%

28	Philippines Sao Tome & Principe	2.52 - 22.28	3.33 - 47.73	3.9% - 72.50%	25.50% - 76.50%
29	South Africa	0.23 - 107.51	25.48 - 90.54	0% - 55.60%	0% - 33.30%
30	Sudan	1.92 - 19.75	4.68 - 183.47	3.30% - 96.70%	3.30% - 83.30%
31	Syria	1.04 - 10.87	10.59 - 148.98	25% - 100%	0% - 75%
32	Tajikistan	1.01 - 4.97	3.33 - 14.38	96.50% - 100%	0% - 98.20%
33	Tanzania	0.25 - 4.52	4.94	5% - 100%	0% - 60%
34	Thailand	1.2 - 6.46	18.79	37.50% - 83.30%	0% - 14.60%
35	Tunisia	1.33 - 6.79	5.37 - 72.64	0% - 100%	4.80% - 100%
36	Uganda	1.15 - 22.15	.86 - 28.17	0% - 100%	0% - 100%
37		0.67 - 5.63	3.78 - 78.82	60% - 95%	0% - 25%

<sup>1</sup>Price is expressed as MPR or the ratio of a medicines' median local unit price (e.g. tablet, milliliter, vial, and dose for an inhaler) across outlets to the Management Sciences for Health (MSH) median international reference price for the year preceding the survey

<sup>2</sup>Availability is defined as the percentage of medicine outlets where a medicine was located on the day of the survey

<sup>3</sup>Lowest Price Generic

<sup>4</sup>Originator Brand

Table 3 shows the ranges of prices and availability for price and availability of a basket of lowest-price generic medicines in the public and private sectors in the 37 countries studied. Price of the basket of lowest-price generic medicines in the public sector varied from free provision to MPR of 19.49 (this means 19.49 times higher that of international reference price), and availability varied from 0% to 100%. The price of the basket of lowest-price

generics medicines in the private sector varied from 0.23 to 107.51 and availability varied from 0% - 100%. These are the crude data for a sample of lowest-price generic medicines, and originator brand medicines are virtually not available in the public sector and unaffordable in the private sector, being offered at 200 times higher that of international reference price.

**Table 4(a) and 4(b). Multiple Regression Analysis of NDP Index and Externality Variables to Access to Medicines**

Independent variables	4(a) Access to medicines (Price expressed by MPR)								
	Public sector lowest-price generic			Private sector lowest-price generic			Private sector originator brand		
	coef.	90% CI	p value	coef.	90% CI	p value	coef.	90% CI	p value
<b>NDP index</b>	.004	-.020 - .027	.787	-.015	-.038 - .008	.271	.020	-.008 - .048	.243
<b>Control of corruption</b>	-.008	-.015 - (-.004)	.010*	-.001	-.004 - .007	.677	.001	-.006 - .007	.868
<b>Voice and accountability</b>	.002	-.004 - .008	.541	.007	.001 - .013	.056	.004	-.003 - .011	.339

\* p < .05 significance level  
coef. - beta coefficient

Independent variables	4(b) Access to medicines (Availability expressed by percentage)											
	Public sector lowest-price generic			Private sector lowest-price generic			Public sector originator brand			Private sector originator brand		
	coef.	90% CI	P value	coef.	90% CI	P value	coef.	90% CI	P value	coef.	90% CI	P value
NDP index	.903	-.499 - 2.306	.283	1.880	.673 - 3.087	.013*	.012	-.021 - .045	.545	-1.330	-2.687 - .027	.107
Control of corruption	.457	.101 - .812	.037*	.212	-.110 - .533	.273	.008	-.000 - .016	.122	.334	-.027 - .695	.127
Voice and accountability	-.330	-.689 - .030	.130	-.193	-.509 - .123	.308	-.008	-.016 - .001	.144	-.036	-.391 - .319	.864

\* p < .05 significance level

coef. - Beta coefficient

Tables 4(a) and 4(b) show the results of multiple regression in predicting access to medicines outcome with three independent variables. No association is seen between the NDP Index and price or availability of medicines in the public sector, while control of corruption is found to be a predictor variable for both availability and price of lowest price generic medicines in the public sector while controlling for other variables in the model. NDP index did show a significant positive regression weight on lowest-price generic availability in the private sector.

## DISCUSSION

Does national drug policy matter in achieving access to medicines in developing countries? A first step in investigating this question was to look for associations between national drug policy index, a composite index of key components of national drug policy, and access to medicines variables (Table 4(a) and 4(b)). There is very little evidence of relationship between NDP index or its separate components with seven measures of access to medicines, including availability and price of generic and originator brand medicines in the public and private sectors (for a full set of dependent variables tested, see Table 2). A significant relationship was found only in one regression model, *availability of lowest price generics in the private sector*. National policies are formulated with priority aim to improve availability in the *public* sector. This isolated finding is questionable. An apparent impact in the private market alone with no corresponding effect in public facilities is suspect, and is likely a spurious result ('Type I error'). However, *control of corruption* was indeed related to price and availability of lowest price generic medicines in the public sector.

The other governance indicator from the World Bank data set, voice and accountability, does not appear to contribute to access to medicines.

As noted above, multiple regression analyses of eight individual NDP components separately did not reveal any consistent relationships with price or availability of medicines. After controlling for other variables, no single NDP component was found to be a predictor for both availability and price of medicines in either public or private sectors. Control of corruption persisted as a predictor of price and/or availability in seven out of eight of these sub-analyses. These results are not presented here but can be reviewed in additional files online<sup>23</sup>

### ***Do external factors matter more than national drug policy?***

These findings suggest, but do not conclusively prove, that corruption is a dominant issue in access to medicines. Countering corruption would appear to be more important than aiming for perfect national drug policies, which has been the main policy emphasis up to now. The pharmaceutical sector in low- and middle-income countries is most susceptible to many forms of corruption due to poor enforcement of laws and regulations.

The lack of meaningful association between NDP and access to medicines in this study can be due to several other reasons other than corruption. First, current WHO indicators used to monitor national drug policies are not sufficient to represent policy on the ground and do not capture the *implementation* process. A fairly simplistic 'check the box' numerical approach to data collection can provide a useful description of national medicines policy on access to medicines, but the reality of what is going on is more subtle and involves human factors and non-quantitative phenomena not captured in existing data sets. There are insufficient data on drug policy implementation. Policy implementation is a complex issue, especially in low- and middle-income countries suffering from

poor access to medicines while going through social, political and economic transition. Considering the lack of impact of national drug policies shown in this study, a closer look at policy implementation is urgently needed. Policy implementation must be studied in the context of the entire health system, employing stronger research designs and adapting techniques from the social and political sciences. Decision makers have been relying on data that measure only the most obvious and easily accessible aspects of policy performance.

### **Scope and Limitations**

The limitations of research methodology in a comparative study must always be borne in mind, particularly when countries are subjects of comparison. The study does not have pre-post measures. It is a post-only study, as the situation that existed before the policy was put into effect is not known. There were no definite comparison groups (countries without NDP). Given the small sample size of 37 countries one must be careful in generalizing the study findings. It was desirable to choose countries similar in terms of geographic characteristics (land-locked or not), similar population size, and a health system structure. However, doing so would decrease the number of countries studied, leaving the study with insufficient statistical power. Available data allows only a study of relationships between national drug policy, governance indicators and desired outcomes. Of course regression results do not prove causation, which can be suspected but not confirmed.

Other than national drug policies, there are other factors that affect access to medicines. For example, this study did not involve policies linked to intellectual property rights and global initiatives of drugs for neglected diseases, as the focus is on in-country policies and strategies. This study did not look into the policy aspects of medicines quality, safety and efficacy (QSE) or rational use of drugs (RUD). Traditional medicines were not included. Access to medicines measurement did not include "physical accessibility" aspect, including distance and travel time to health facilities or pharmacies. WHO pharmaceutical situations assessment of 2003 indicators also did not disaggregate price into its various components

(procurement price, taxes, tariffs mark-ups for wholesalers and retailers, distribution costs, dispensing fees, etc.). These components are recognized as important medicine price determinants and should be considered in future studies. Other related factors which were not included in this study are the effects of donor programs that can skew or limit national governments' abilities to set health policy, debt servicing and conditionality for loans from international financial institutions that can further limit government responsiveness to basic social service needs of citizens<sup>24</sup>, peripheral hospital and health units' staffing and infrastructure that can affect the provision of services and medicines to the periphery, poor accountability in the health sectors, and the relationship between the public and private sectors to achieve the stated goals. No data was available on use of medicines within households, so it was not possible to look at intra-household allocation of medicines, for example gender inequities. Rural and urban differences of health sector development are not incorporated due to insufficient data.

### **CONCLUSION**

Despite the fact that data has been available for many years, until now no multi-country study of the impact of national drug policies on access to medicines has been done. This is extraordinary, considering the widely recognized problem of low access to medicines in poor countries, the tremendous effort that has been invested to develop national drug policies, and the availability of data on national policies and on access to medicines. This study has aimed to fill that gap. There were significant methodological barriers; including unavoidably complex methodological steps of multiple imputation of missing data, normalization, weighting, aggregation and sensitivity testing of national drug policy index models to ensure robustness of NDP index. Yet even though NDP index was confirmed to be a stable indicator, we did not find systematic associations that supported study propositions. There is no convincing evidence that national drug policies are associated with better access to medicines, nor are individual NDP components, with very few exceptions. However, there were indications that corruption may be an important determinant of access to medicines. Control of

corruption appears to matter more than other governance indicators as well as national drug policies.

### **Implications and recommendations**

Research on relevance of national drug policy to access to medicines must move beyond static descriptions of existing policies using checklist data collection tools, toward a more nuanced study of policy *implementation*, with attention to qualitative aspects. This will require more comprehensive data collection methods and application of research tools adapted from the social and political sciences. It is difficult to reflect political and social realities in indicators. But it is a task that must be done in order to achieve sound health policy analysis.

Second, if further studies confirm the confounding effect of *corruption* on access to medicines in low and middle-income countries, national authorities must address this problem if they wish to improve access to medicines for their populations.

**Authors' disclaimer:** the opinions expressed in this paper are those of the authors and may not reflect the position of their employing organizations

**Acknowledgements:** The authors acknowledge with thanks review and suggestions made by Marc Van der Putten of the School of Global Studies, Thammasat University (Thailand); and the staff and logistic support provided by Thammasat's Faculty of Public Health and School of Global Studies.

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