

Jane Robertson et al.

## Availability of essential children's medicines

### What essential medicines for children are on the shelf?

Jane Robertson,<sup>a</sup> Gilles Forte,<sup>b</sup> Jean-Marie Trapsida<sup>c</sup> & Suzanne Hill<sup>b</sup>

<sup>a</sup> University of Newcastle, Callaghan, NSW, 2308, Australia.

<sup>b</sup> World Health Organization, Geneva, Switzerland.

<sup>c</sup> World Health Organization, Regional Office for Africa, Brazzaville, the Republic of the Congo.

Correspondence to Jane Robertson (e-mail: jane.robertson@newcastle.edu.au).

(Submitted: 31 March 2008 – Revised version received: 22 July 2008 – Accepted: 24 July 2008 –  
Published online: 6 January 2009)

*Bull World Health Organ* 2009;87:XXX–XXX.

**Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. المقالة لهذه النص نهائية في الخلاصة لهذه العربية الترجمة.**

#### Abstract

**Objective** To document the inclusion of key medicines for children in national essential medicines lists (EMLs) and standard treatment guidelines, and to assess the availability and cost of these medicines in 14 countries in central Africa.

**Methods** Surveys were conducted in 12 public and private sector medicine outlets in each country's capital city. Data were collected on medicine availability on the survey day and on the cost to the patient of the lowest priced medicine in stock.

**Findings** The proportion of survey medicines in national EMLs ranged from 50 to 90%. In only three countries were more than 50% of such medicines available from central medical stores (range: 15–75%). Availability in nongovernmental organization stores was not consistently better (range: 10–65%) but tended to be higher in teaching hospitals, although the range was similar (15–70%). District hospitals (range: 10–80%) had slightly better availability than teaching hospitals, while primary health care clinics generally had poorer availability (range: 28–48%). Retail or private pharmacies tended to have more survey medicines available (range: 38–63%). There was considerable variability in prices, which tended to be higher in retail pharmacies.

**Conclusion** The availability of key essential medicines for children was poor. Better understanding of the supply systems in the countries studied and of the pattern of demand for medicines is needed before improvements can be made. Medicines must be available, affordable and acceptable to patients. Substantial progress towards Millennium Development Goals will not occur without a major effort to improve access to medicines for children.

#### Introduction

In 2006, an estimated 9.7 million children under the age of 5 years died,<sup>1</sup> a figure that represents a slight decline in the global death rate from 2000–03.<sup>2</sup> The major causes of death have been clearly defined as pneumonia, diarrhoea, malaria, neonatal pneumonia and sepsis, disease entities for which effective treatments are known. However, many interventions are

unavailable or in limited supply in resource-poor settings. In a review of progress towards UN Millennium Development Goal 4 for reducing child mortality that was carried out in 2006, no data were available to describe the coverage or availability of antibiotic treatment for pneumonia, an intervention said to be relevant to 60 countries.<sup>3</sup> Data on the availability of oral rehydration therapy and antimalarials were available for 50 and 31 countries, respectively.

Even where a medicine is available, the cost to patients or their families may make it unaffordable. Comparisons made using the Management Sciences for Health's *International drug price indicator guide*<sup>4</sup> show that the prices of antiretroviral medicines in children's formulations are two to eight times those of adult equivalents. For asthma, a chronic disease, metered-dose inhalers are substantially more expensive than less-effective oral forms of the same medicine. In the absence of detailed information about the prices of such medicines, it is difficult to recommend appropriate policy interventions to improve access and availability.

Recognizing that better access to medicines is a prerequisite for improving health outcomes in children, in May 2007 the World Health Assembly passed Resolution WHA60.20, which identified key steps for ensuring better medicines for children.<sup>5</sup>

Resolution WHA60.20 urges the 193 WHO Member States:

to promote access to essential medicines for children through inclusion, as appropriate, of those medicines in national medicine lists, procurement and reimbursement schemes, and to devise measures to monitor prices.

Given the paucity of data on the availability and cost to the patient of paediatric medicines in different health-care settings, the objectives of this study were to document the extent to which key children's medicines are currently included in national essential medicine lists (EMLs) and standard treatment guidelines, to assess the availability of key children's medicines in public and private health-care facilities and to estimate the costs of these medicines to patients in a sample of countries in central Africa. Countries included in the study were selected because they had a WHO medicines adviser and a national professional officer able to coordinate and conduct the surveys. All 14 participating countries were in the WHO African Region and comprised Cameroon, Chad, the Congo, the Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Mali, Nigeria, Rwanda, Senegal, Uganda, the United Republic of Tanzania and Zambia.

## Methods

The survey covered 17 different medicines in 20 dosage forms suitable for children. They were identified by an expert group of clinicians and pharmacists and included medicines for priority diseases. The medicines and their indications are listed in Table 1. Thirteen of the items surveyed were included in the 15th *WHO model list of essential medicines*<sup>6</sup> in the exact dosage form and strength specified in this survey, while an additional two were included in the WHO list at a different strength. Another three were included in the First *WHO model list of essential medicines for children*.<sup>7</sup> The survey list was refined in discussions with national professional officers from participating countries during a workshop. Survey data collectors reported whether the selected medicines were included in national EMLs and standard treatment guidelines and detailed the availability and cost of the medicines in several health-care facilities and medicine outlets in both the public and private sector.

The methods for selecting public and private health-care facilities for inclusion in the survey were based on those used in pricing surveys carried out by the WHO and Health Action International.<sup>8</sup> In this study, data collection was limited to capital cities only. Twelve facilities were surveyed in each country: the central medical store (CMS), one nongovernmental organization (NGO) store, one teaching hospital, one district hospital, three primary health care clinics and five private or retail pharmacies.

In each country, data collection was overseen and verified by the national professional officer. In four countries, national professional officers either carried out or contributed to data collection, while in another four data collection was undertaken by two individuals in each health-care facility. Most survey forms were completed by health professionals with a pharmacy, medical or academic (i.e. doctoral or professorial) qualification. In all but one country, the forms were completed by three or fewer individuals. While we did not undertake systematic verification of the data, the fact that fewer trained health professionals were usually involved makes it likely that the reported data accurately reflect the situation within the selected health-care facilities.

For each facility, the survey documented whether each medicine was available on the day of the survey and, if it was, it determined the cost to the patient of the lowest priced product available, whether branded or generic, depending on the stock. Costs were reported in the local currency and later converted to United States dollars. Where data were collected from more than one facility of a particular type, the average for those facilities was used in comparisons. Statistical analysis was descriptive only.

The research ethics committees of the WHO and the University of Newcastle in Australia judged that the study protocol did not require approval by an institutional ethics committee, as the project satisfied the relevant criteria for an audit.

## Results

Data collected between May and June 2007 were received from all 14 countries. Eight provided results for all 12 facilities, two for 11 facilities (in one no NGO store was surveyed) and one for seven facilities (where there was no private pharmacy). The remaining three countries provided data from more than 12 facilities, which included results from additional public and private sector outlets.

### **EMLs and standard treatment guidelines**

The proportion of the 20 survey medicines included in national EMLs ranged from 50–90% (Fig. 1). In four countries there was a match between medicines included in the national EML and those included in standard treatment guidelines; in three, more of the survey medicines were included in standard treatment guidelines than in the EML. In the remaining seven countries, some medicines in the EML were not included in local standard treatment guidelines, but most differences were small.

### **CMSs and NGO stores**

In 13 of the 14 countries, the proportion of survey medicines available in the CMS was smaller than the proportion listed in the national EML. In only three countries were more than 50% of the medicines available in the CMS at the time of the survey (Fig. 1). The availability in NGO stores was not consistently better than in CMSs: the range in NGO stores was 10–65% and in CMSs, 15–75%.

The medicines that were most frequently available in CMSs were co-trimoxazole suspension (12 countries), oral rehydration salts (11 countries), paracetamol syrup (10 countries), nevirapine syrup (10 countries), amoxicillin suspension (9 countries), ceftriaxone 1-g injection (9 countries) and salbutamol inhalers (8 countries). The least available survey medicines were rifampicin syrup (0 countries), vitamin A liquid 50 000 IU/ml (0 countries), zinc 20-mg dispersible tablets (1 country), beclometasone inhalers (2 countries) and albendazole suspension (3 countries). While not included in the analysis, spacer devices for use with salbutamol or beclometasone inhalers were available in only one CMS.

In 10 countries, the proportion of medicines that were included in the national EML and that were available in the CMS on the day of the survey was only slightly lower than the proportion of all 20 survey medicines available in the CMS. In four cases, the proportions were the same. These observations indicate that, generally, the CMS stocked those medicines that were identified as essential in that country.

### **Availability by type of health-care facility**

The availability of survey medicines tended to be greater in teaching hospitals than in CMSs. In 10 of the 14 teaching hospitals surveyed, the same or a larger proportion of the medicines was available than in the corresponding CMS, though the range of the proportions available was slightly smaller overall for teaching hospitals: the range in teaching hospitals was 15–70%, and in CMSs, 15–75%. Eight of the 14 district hospitals had more survey medicines available than the corresponding teaching hospital, which may reflect the nature of the medicines included in the study. However, the ranges of the proportions available were similar: 15–70% in teaching hospitals and 10–80% in district hospitals. In primary health care clinics, the availability of medicines was generally lower than in hospital facilities, though the range of the proportions available was much smaller across countries, being 28–48%. Retail and private pharmacies tended to have more of the survey medicines available and there was a narrow range across countries (38–63%) (Fig. 2).

### **Subanalysis of 10 key medicines**

To counter possible criticisms that the 20 medicines surveyed included some that were not on the *WHO model list of essential medicines*, that more than one form of the same drug was included, that anthelmintic medicines were over-represented and that the medicines surveyed included treatments for priority diseases for which the choice of medicine may be influenced by donor programmes or local treatment preferences, a separate analysis of a subset of 10 key medicines was undertaken (data not shown). The 10 medicines included were: amoxicillin, ceftriaxone 1-g injection, co-trimoxazole, mebendazole tablets, nystatin, oral rehydration salts, paracetamol, salbutamol, vitamin A capsules and zinc. The findings were consistent with those obtained using the larger data set: in general, fewer medicines were available in CMSs than listed in EMLs or included in standard treatment guidelines; NGO stores were not consistently better stocked; primary health care clinics had fewer medicines available than either teaching or district hospitals; and private sources of medicine, such as retail

pharmacies, generally had more medicines available on the day of the survey than public health-care facilities.

### **Cost of medicines**

The variability and range of the prices paid by patients for five selected medicines in both the public and private sector across all countries are shown in Table 2. A variability of 1.0 means that the same price was charged in all similar facilities within a country (for example, in all primary health care clinics or retail pharmacies surveyed). A large variability may reflect the availability of only a branded product rather than a cheaper generic equivalent. The range of prices paid by patients varied considerably between countries. The highest prices were not always in private retail pharmacies, although prices tended to be lower in the public sector overall.

### **Discussion**

This study is the first significant attempt to collect data on the availability of children's medicines in a number of countries simultaneously. The major strengths of the study are that it was conducted in 14 countries over a similar period of time and that simple data collection methods were used. Practical tools for the ongoing monitoring of medicines within countries must be easy to use and should not involve sophisticated data collection or require extensive training, and surveys should be inexpensive to carry out. Allowing data collection tools to be flexible enough to include local priorities for medicines will increase the relevance and usefulness of the surveys in each country.

The limitations of this study are that each survey included only a single sample from each facility and involved a relatively limited number of facilities in the capital city of each country. However, it is likely that medicine availability in the capital city represents the most optimistic picture of the supply situation within a country, with medicines being less available in more rural areas. Follow-up surveys could include public and private sector medicine outlets in regional and rural areas.

### **Availability by type of health-care facility**

The key finding of this survey is that, although the majority of medicines evaluated were considered to be essential as indicated by national EMLs and standard treatment guidelines, on average only half were available in the facilities surveyed. Overall, the average proportion of the 20 survey medicines available varied from approximately 35% in primary health care clinics to approximately 50% in private retail pharmacies. Availability was higher in private

or retail pharmacies in all countries that reported data on private sector outlets. However, there was substantial variability between countries. In Nigeria, for example, less than 20% of survey medicines were available in the CMS.

Generally the proportion of medicines available was lower in primary health care clinics than in teaching or district hospitals. As the medicines included in the survey were selected because they were common preparations likely to be used in primary care, these observations are concerning and must be confirmed in follow-up surveys.

There was also some variation in the pattern of availability of individual medicines. For example, oral rehydration salts, paracetamol syrup and anti-infectives (e.g. amoxicillin and co-trimoxazole suspensions and injectable ceftriaxone) were generally available in CMSs. However, this does not ensure the adequate distribution or appropriate use of these medicines. By contrast, the absence of zinc sulfate preparations in both public and private sector outlets is a concern. Clinical trials have established the importance of zinc supplementation for reducing the duration and severity of diarrhoeal illnesses,<sup>9-11</sup> and the absence of palatable and affordable zinc preparations is an ongoing problem.

### **Asthma medicines**

Salbutamol inhalers were widely available, but spacer devices for their effective use in children were not. Few participating countries reported that instructions for “home-made” spacer devices were routinely supplied. Beclometasone inhalers were rarely reported as available in public sector facilities and, when available in the private sector, they tended to be expensive. These observations raise questions about the management of respiratory illness. Several national professional officers identified oral salbutamol preparations (i.e. syrup and tablets) as additional paediatric medicines that should be monitored in their countries. These oral forms are used rarely in developed countries because of their limited effectiveness.<sup>12,13</sup> Further work is needed to understand local treatment practices and preferences and to identify barriers to the more widespread use of metered-dose inhalers in children.

### **Priority diseases**

There was considerable variation in the availability of nominated medicines for the priority diseases of HIV infection, tuberculosis and malaria. Nevirapine syrup was fairly widely available, artemether plus lumefantrine and isoniazid tablets were less available, and rifampicin syrup was not available in any of the participating countries. The poor availability of these medicines might indicate that there were problems with the appropriate dosage forms

for children. Alternatively, the existence of vertical programmes for these priority diseases may mean that the medicine supply is not coordinated with standard supply chains in these countries. Other authors have commented on the potential inefficiencies that can follow from this form of segmentation in the supply of medicines.<sup>14,15</sup>

### **Costs of medicines**

The comparisons of costs between public and private sectors were limited in many countries because free medicines were provided by public sector outlets. Moreover, data were only collected when the particular medicine was available, and the price of the cheapest product available was then recorded. Therefore, data were only collected on a small number of medicines in some health-care facilities and did not distinguish between generic and branded products. These limitations restrict the conclusions that can be drawn on the affordability of medicines and the range of prices that patients might be asked to pay. Despite these limitations, considerable variations in prices were reported in both public and private sectors, although the variability tended to be greater and the prices higher in the private sector. This has implications for the affordability of medicines for children. While in many of the countries surveyed medicines were provided free of charge to children in public sector outlets, where a medicine was only available in private outlets, the cost may preclude access.

### **Medicines covered**

In this study, medicine availability was determined by the presence of the medicine in the health-care facility on the day of the survey; the medicine may have been present either in the defined strength and pack size or in a different pack size. It is possible that a facility may have stocked medicines that were similar to those on our survey list but not counted, raising the criticism that our survey unfairly portrayed the availability of children's medicines in a particular country. However, the survey medicines were chosen by an expert panel and were selected because they were all preparations with proven effectiveness and cost-effectiveness in the management of conditions commonly encountered in primary care. That the majority of these medicines were included in the EMLs and standard treatment guidelines of participating countries supports the validity of the choices made. The small number of medicines surveyed might also be seen as a limitation of the study. However, our intention was to demonstrate the utility of a concise, easy-to-use data collection tool that is sufficiently flexible to be adapted to local circumstances.

### **Conclusions**

Access to medicine is a complex construct because medicines not only have to be available, they also have to be affordable and acceptable to patients. Much work remains to be done at the level of individual countries to understand these factors better. There is a need to move beyond simply determining whether a medicine is available in the CMS or other health-care facility towards considering prescribing practices, the relevance and appropriateness of standard treatment guidelines and patient compliance in both accessing and taking the medicines as recommended. However, before questions about the supply of and demand for a particular medicine or practice within specific types of health-care facilities can be addressed, an important first step is to understand what is available in the country, and where. From this study, we cannot infer whether poor availability reflects imperfections in purchasing mechanisms or the pattern of demand for medicines within individual countries; that is, whether the poor availability of a medicine determines prescribing practices or whether prescribing practices dictate purchasing patterns. More detailed studies of local prescribing practices are required.

What is clear, however, is that this survey highlights several issues. First, if the availability of these essential medicines for children is as poor as is suggested by the results of this study, we have a lot to do to understand what is happening in the supply systems for medicines in these countries before we can improve them. Second, we need to understand the demand side of the equation, and that includes understanding the factors that determine prescribing practices and the cost of children's medicines. Finally, given that the medicines studied in this survey are essential for improving mortality, it is clear that we will not make much progress towards millennium development goals without a major effort to improve access to medicines for children.

World Health Assembly Resolution WHA60.20 provides a framework for addressing problems with the availability of and access to children's medicines. Member States need to respond to this resolution. The simple data collection tools used in this study could easily be adapted to local circumstances to facilitate carrying out surveys on the availability and price of medicines for children on a regular basis.

### **Acknowledgements**

This study was undertaken in collaboration with WHO medicines advisers and national professional officers in Cameroon, Chad, the Congo, the Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Mali, Nigeria, Rwanda, Senegal, the United Republic of Tanzania, Uganda and Zambia, and it was supported by the WHO Regional Office for Africa. Their

participation and support and that of all the collaborating ministries of health are gratefully acknowledged.

### Competing interests:

None declared.

### References

1. UNICEF. *Progress for children: a world fit for children: statistical review, number 8, December 2007*. Available from: [http://www.unicef.org/publications/files/Progress\\_for\\_Children\\_No\\_6\\_revised.pdf](http://www.unicef.org/publications/files/Progress_for_Children_No_6_revised.pdf) [accessed on 16 December 2008].
2. Bryce J, Boschi-Pinto C, Shibuya K, Black RE, and WHO Child Health Epidemiology Reference Group. WHO estimates of the causes of death in children. *Lancet* 2005;365:1147-52. PMID:15794969 doi:10.1016/S0140-6736(05)71877-8
3. Bryce J, Terreri N, Victora CG, Mason E, Daelmans B, Bhutta ZA, et al. Countdown to 2015: tracking intervention coverage for child survival. *Lancet* 2006;368:1067-76. PMID:16997661 doi:10.1016/S0140-6736(06)69339-2
4. Management Science for Health (MSH). *International drug price indicator guide 2006*. Available from: <http://erc.msh.org/mainpage.cfm?file=1.0.htm&module=Dmp&language=English> [accessed on 12 March 2008].
5. Sixtieth World Health Assembly. *Resolution WHA60.20. Better medicines for children*. Available from: [http://www.who.int/gb/ebwha/pdf\\_files/WHA60/A60\\_R20-en.pdf](http://www.who.int/gb/ebwha/pdf_files/WHA60/A60_R20-en.pdf) [accessed on 2 January 2008].
6. *WHO model list of essential medicines, 15th list, March 2007*. Geneva: World Health Organization; 2007. Available from: <http://www.who.int/medicines/publications/EML15.pdf> [accessed on 2 January 2008].
7. *WHO model list of essential medicines for children, first list, October 2007*. Available from: [http://www.who.int/childmedicines/publications/EMLc%20\(2\).pdf](http://www.who.int/childmedicines/publications/EMLc%20(2).pdf) [accessed on 12 March 2008].
8. Health Action International. *Medicines prices: a new approach to measurement*. 2nd edn. 2008. Available from: <http://www.haiweb.org/medicineprices/manual/documents.html> [accessed on 16 December 2008].
9. Strand TA, Chandyo RK, Bahl R, Sharma PR, Adhikari RK, Bhandari N, et al. Effectiveness and efficacy of zinc for the treatment of acute diarrhea in young children. *Pediatrics* 2002;109:898-903. PMID:11986453 doi:10.1542/peds.109.5.898
10. Thapar N, Sanderson IR. Diarrhoea in children: an interface between developing and developed countries. *Lancet* 2004;363:641-53. PMID:14987892 doi:10.1016/S0140-6736(04)15599-2

11. WHO/UNICEF Joint Statement on Clinical Management of Acute Diarrhoea. Geneva/New York: World Health Organization/United Nations Children's Fund; 2004. Available from: [http://www.who.int/child\\_adolescent\\_health/documents/who\\_fch\\_cah\\_04\\_7/en/index.html](http://www.who.int/child_adolescent_health/documents/who_fch_cah_04_7/en/index.html) [accessed on 12 March 2008].
12. Global Initiative for Asthma (GINA). *Pocket guide for asthma management and prevention in children: a pocket guide for physicians and nurses*. Gig Harbor, WA: Medical Communications Resources Inc.; 2006. Available from: <http://www.ginasthma.com/download.asp?intlId=216> [accessed on 2 January 2008]
13. Louridas G, Kakoura M, Galanis N, Patakas D, Kastritsi K. Bronchodilatory effect of inhaled versus oral salbutamol in bronchial asthma. *Respiration* 1983;44:439-43. PMID:6648053
14. England R. The dangers of disease specific aid programmes for developing countries. *BMJ* 2007;335:565. doi:10.1136/bmj.39335.520463.94
15. Travis P, Bennett S, Haines A, Pang T, Bhutta Z, Hyder AA, et al. Overcoming health-systems constraints to achieve the Millenium Development Goals. *Lancet* 2004;364:900-6. PMID:15351199 doi:10.1016/S0140-6736(04)16987-0

**Table 1. The 17 children's medicines in 20 dosage forms included in an availability survey, in 14 central African countries, and indications for their use**

Medicine	Dosage form	Indication in WHO treatment guidelines
Albendazole	Chewable tablet, 200 mg	Helminthiasis
Albendazole <sup>a</sup>	Suspension, 100 mg/5 ml	Helminthiasis
Amoxicillin <sup>b</sup>	Suspension, 125 mg/5 ml	Infections including pneumonia
Artemether plus lumefantrine	Tablet, 20 mg + 120 mg	Malaria
Beclometasone	Inhaler, 50 µg/dose	Asthma
Ceftriaxone <sup>b</sup>	Injection, 1-g vial	Severe infections, including meningitis
Ceftriaxone	Injection, 250-mg vial	Severe infections, including meningitis
Co-trimoxazole <sup>b</sup>	Suspension, 200 mg + 40 mg/5 ml	Pneumonia or prophylaxis of <i>Pneumocystis carinii</i> pneumonia
Isoniazid	Tablet, 100 mg	Tuberculosis
Mebendazole <sup>b</sup>	Chewable tablet, 100 mg	Helminthiasis
Mebendazole <sup>a</sup>	Syrup, 100 mg/5 ml	Helminthiasis
Nevirapine	Syrup, 50 mg/5 ml	HIV infection
Nystatin <sup>a,b</sup>	Drops, 100 000 IU/ml	Oral candidiasis
Oral rehydration salts <sup>a</sup>	Packet	Diarrhoea
Paracetamo <sup>b</sup>	Syrup, 120 mg/5 ml	Pain
Rifampicin <sup>a</sup>	Syrup, 100 mg/5 ml	Tuberculosis
Salbutamol <sup>b</sup>	Inhaler, 100 µg/dose	Asthma

Vitamin A <sup>b</sup>	Capsules, 100 000 IU (30 mg)	Prophylaxis
Vitamin A <sup>a</sup>	Liquid preparation, 50 000 IU/ml	Prophylaxis
Zinc <sup>b</sup>	Tablet, 20 mg dispersible	Diarrhoea

<sup>a</sup> Not included in the *WHO model list of essential medicines, 15th list, March 2007*.<sup>6</sup>

<sup>b</sup> Included in the subanalysis of 10 key medicines for children discussed in the text.

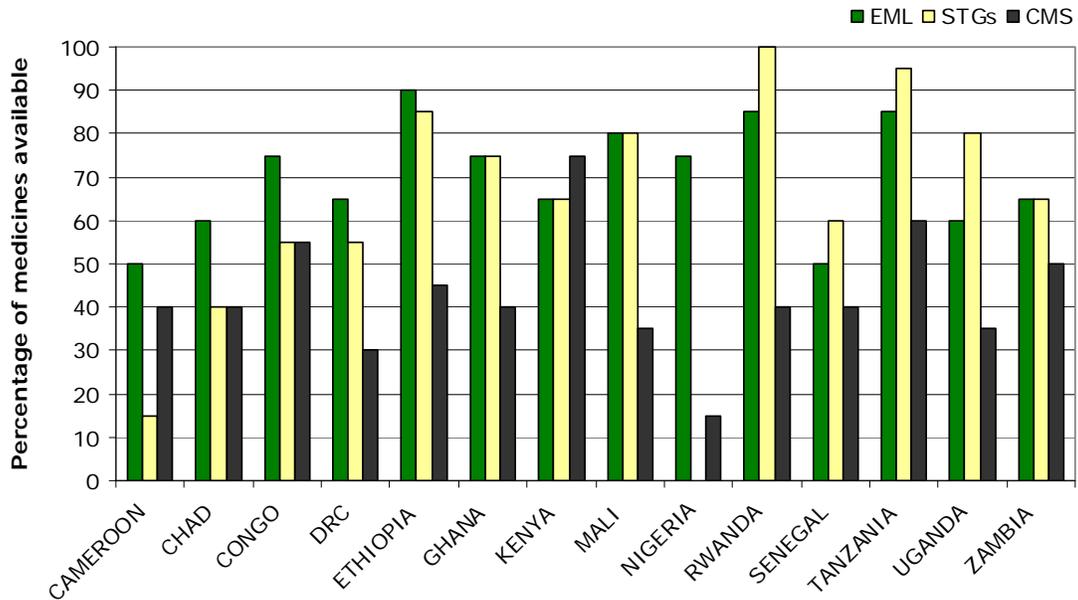
**Table 2. Variability in and range of prices paid by patients for five selected children's medicines in the public and private sector across 14 countries in central Africa**

Medicine	Variability in prices across countries <sup>a</sup>		Range of prices <sup>b</sup> (US\$)	
	Public sector	Retail pharmacy	Public sector	Retail pharmacy
Amoxicillin suspension 125 mg/5 ml (100 ml)	1.3–2.6	1.3–2.3	0.44–2.13	0.27–4.16
Ceftriaxone 1-g injection (one vial)	1.1–17.8	1.1–5.3	0.82–26.63	0.54–18.67
Co-trimoxazole suspension 200 mg + 40 mg/5 ml (100 ml)	1.6–3.4	1.1–16.4	0.27–4.16	0.27–5.62
Paracetamol syrup 120 mg/5 ml (100 ml)	1.3–3.0	1.0–1.8	0.27–2.71	0.27–2.85
Salbutamol inhaler 100 µg/dose (1 unit)	1.0–2.0	1.0–2.8	1.30–7.25	2.07–7.47

<sup>a</sup> A variability of 1.0 means that the same price was charged in all similar health-care facilities within a country. The variability was calculated when more than one price was provided for public sector facilities. The variability within each country was calculated and the range of the variability across countries is listed in the table.

<sup>b</sup> Range of prices across all countries reporting usable data.

**Fig. 1.** Proportions of the 20 survey medicines included in the national EML or standard treatment guidelines or available from the CMS, in 14 countries in central Africa<sup>a</sup>



CMS, central medical store; EML, essential medicines list.

<sup>a</sup> In Nigeria, the standard treatment guidelines were under review and not available for this study.

**Fig. 2. Proportion of 20 survey medicines available from public and private sector facilities, in 14 countries in central Africa**

