Pricing and availability of some essential child specific medicines in Odisha

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Introduction

More than half of the deaths in children are caused by diseases that could be treated with safe, essential, and child-specific medicines. The continuous availability of affordable medicines is a key factor to reduce infant mortality. Availability of medicines is intimately related to its cost. Most of the health expenditure in India including the cost of medicines is met from out of pocket expenses of the patients. Odisha is an Eastern Indian state with an infant mortality rate that is the second highest in the country. Public health facilities provide about 90% of medical care, and the organized private sector is very thin for the state. Despite the peoples’ reliance on the public system, evidence has highlighted huge gaps and

ABSTRACT

Objectives: Continuous availability of affordable medicines in appropriate formulations is essential to reduce morbidity and mortality in children. Odisha an eastern Indian state records very high mortality of children. The study aims at documenting the availability and prices paid for purchasing essential child-specific medicines.

Materials and Methods: The survey of 34 essential medicines was conducted in six randomly selected districts of Odisha. Data were collected from medicine outlets of the public, private, and other sector (Nongovernmental Organization [NGO]/mission sectors) of six randomly selected districts, using WHO/Health Action International medicine price collection methodology. For each medicine surveyed, data were collected on the highest and lowest-priced formulations available in each facility.

Results: Both public sector and other sector health facilities procure only one brand of medicines, mean percentage availability of medicines being 17% and 21.8%, respectively. In the private sector, the mean percentage availability of the high and lowest-priced medicines for a particular drug product was 10.8% and 38.5%, respectively. The public sector procurement price is 48% lower than international reference prices. In the private sector, high-priced, and low-priced products are sold at 1.83 and 1.46 times the international reference price, respectively. Substantial price variation was observed for some medicines across individual outlets. Medicines were found to cost 2.08 times their international reference price in NGO/mission sector facilities.

Conclusions: The availability of children’s medicines in public sector facilities of Odisha state is poor. Medicines for children cost relatively high in both private and NGO sectors compared to the international reference price. The availability medicines should be improved on an urgent basis to improve access of medicines for children of Odisha.

KEY WORDS: Availability, children, drug pricing, essential medicines

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have suggested that institutions do not operate at optimal levels. The present study aims at exploring the availability of different essential child-specific formulations and prices the patient pays to purchase these medicines in different health sectors of Odisha.

Materials and Methods

This observational cross-sectional study was conducted as part of “better medicines for children project in India”. Ethics Committee clearance from S.C.B. Medical College and Hospital Cuttack was obtained before starting the study. Requisite permission from the Director of Health Services and Drugs Controller of Odisha was obtained before initiating the study. The survey used a standard methodology for measuring medicine prices and availability developed by WHO and Health Action International (HAI). The survey work was conducted in six randomly selected districts of Odisha (Cuttack, Sambalpur, Ganjam, Kalahandi, Kandhamal, and Balasore) from different geographical locations of the state and were conducted from September 15, 2010 to April 15, 2011 [Figure 1].

Selection of Survey Area

In each district, the major urban health center was selected as one central area, and an additional five areas were chosen randomly from different geographical locations of the district (that could be reached within a day’s drive from the central survey point or headquarter) so that the collected data represent the data for the whole district. From the public sector, ten primary health centers, two community health centers, one district headquarter hospital, and one medical college hospital were included that constituted 14 sample areas for the survey. Thus, 79 outlets were surveyed in each of the public, private sectors and five outlets were surveyed in the Nongovernmental Organization (NGO)/mission sector (other sector).

Data Collection

All survey personnel received training on the standard survey methodology and data collection/data entry procedures at a training workshop. Each day, 20% of the medicine outlets were independently surveyed. Government procurement data were obtained from the State Drug Management Unit (SDMU) in Bhubaneswar that serves as the central procurement agency for the whole state.

Selection of Medicines

A total 34 child-specific formulations [Table 1] were selected based on recommendations of the committee that was engaged in the preparation of the child-specific essential medicines list for the state. For each formulation, a specific pack size was searched for in order to obtain a uniform unit price [Table 1]. For each available medicine, highest-price, and lowest-price products were entered in a standard medicine price data collection form.

Data Entry and Statistical Analysis

Availability of different surveyed medicines and medicine unit prices were entered into the preprogrammed MS Excel

| Medicine name, formulation and strength | Target pack size |
|----------------------------------------|-----------------|
| Albendazole, suspension, 200 mg/5 ml   | 10 ml           |
| Amoxicillin, suspension, 125 mg/ml     | 60 ml           |
| Amoxicillin, dispersible scored tablet, 250 mg | 15 tabs |
| Amoxicillin + clavulanic acid, dry syrup, 125 mg + 31.25 mg | 30 ml |
| Amoxicillin + clavulanic acid, dispersible kid forte, 250 mg + 125 mg, FC tablet | 10 tabs |
| Artemether + lumefantrine, dispersible tablet, 20 mg + 120 mg | 6x1 |
| Biclorometasone inhaler 100 µg/dose | 200-dose inhaler |
| Benzyl benzoate lotion 25% | 100 ml |
| Benzylpenicillin injection 600 mg = 1 million IU | 1 vial |
| Carbazepine, suspension, 100 mg/5 ml | 100ml |
| Carbamazepine, chewable tablet, 100 mg | 10 tabs |
| Chloramphenicol injection 500 mg/vial | 1vial |
| Chloroquine, suspension, 50 mg/5 ml | 60 ml |
| Co-trimoxazole, dispersible tablet, 100 mg + 20 mg (also expressed as 400 mg + 80 mg) | 10 tabs |
| Diazepam, rectal solution, 5 mg/ml | 5 ml |
| Ferrous sulfate, suspension, 50 mg Fe/5 ml | 150 ml |
| Gentamycin injection 10 mg/ml | 2 ml ampoule |
| Ibuprofen, tablet, 200 mg | 24 tabs |
| Isoniazid + rifampicin + pyrazinamide, dispersible tablet, 50 mg + 100 mg + 300 mg | 10 tabs |
| ORS, sachet, 200 ml | 1 sachet |
| ORS, sachet, 1 l | 1 sachet |
| Paracetamol, suspension, 120 mg/5 ml or 125 mg/5 ml | 60 ml |
| Paracetamol, scored tablet, 250 mg | 10 tabs |
| Phenobarbital injection 200 mg/ml | 1 ml ampoule |
| Phenytoin, suspension, 25 or 30 mg/ml | 500 ml |
| Procaine penicillin injection 1 g = 1 million IU | 1 vial |
| Salbutamol inhaler 100 mcg/dose | 200-dose inhaler |
| Vitamin A, capsule, 25 000 IU | 30 |
| Zinc, dispersible tablet, 20 mg | 14 tabs |
| Prednisolone, suspension, 5 mg/5 ml | 60 ml |
| Azithromycin, dispersible tablet, 250 mg | 6/10 tabs |
| Ofloxacin, tablet, 200 mg | 10 tabs |
| Ondansetron, syrup/suspension, 2 mg/5 ml | 30 ml |
| Valproic acid, oral liquid, 200 mg/5 ml | 100 ml |

Target pack size: Pack sizes of medicines for which price data was collected

Figure 1: Map of Odisha State with Six Districts of Odisha state covered for medicine survey
Workbook (WHO-HAI workbook ver 5 MSH2009-Part I, Orissa) provided as part of the WHO/HAI methodology. Data entry was checked using the double entry, data checker, and automated analysis features of the workbook. The exchange rate used to calculate median price ratios (MPRs) was US$ 1 = Rs. 45.20; this was the commercial “buy” rate taken from a local bank on the 1st day of data collection. The 2009 Management Sciences for Health reference prices, taken from the international drug price indicator guide was followed for comparison of prices.

Results

The survey revealed that public sector availability was low at 17.0% with very high deviation in availability (±26.3) with the exception of ofloxacin, oral rehydration solution (ORS) (for 1 L) and albendazole suspension. Only 14 formulations were procured by SDMU. Innovator branded products were rarely available even in private sectors of Odisha. In the private sector, a range of drug products was available for some surveyed medicines which were categorized as low priced or high priced. Availability of lowest-priced generics in the private sector was better (38.5%) than in the public sector [Table 2]. High-priced branded generic products were also found in the private sector; with an average availability of 10.8%. Availability of lowest-priced generic medicines in NGO/mission sector facilities was found out to be 21.8%. Only one drug product was available at a particular time in both public sector and other sector (NGO/mission) outlets.

ORS (for 1 L) was widely available with 85% or more in all three sectors. Dispersible zinc tablets, however, were scarce with the availability of <5% in all the three sectors. Availability of antibiotics was consistently less in more than 60% of outlets except ofloxacin 200 mg tab [Figure 2]. From the antiasthmatic group, beclomethasone inhaler was scarce with <5% availability in all three sectors [Table 3]. Salbutamol inhaler was found both in the public and private sectors (51.2% and 64.6%, respectively), but was not available in the NGO/mission sector. No antiepileptic preparation was available in public sector facilities. In the private sector, the valproic acid oral syrup was most commonly available (42.7%).

Medicine Prices

The study revealed that Government procurement agency (SDMU) is purchasing medicines at approximately half the international reference prices (MPR of 0.52) that suggest relatively efficient purchasing though the number of medicines procured is less. Table 4 depicts the median values have been depicted along with corresponding 25th and 75th percentiles.

In the public sector, the lowest price generic medicines were being sold at 1.46 times their international reference price. Half the lowest-priced medicines were priced at 1.06–2.29 times their international reference price while half of the highest-priced medicines were priced between 1.57 and 2.67. This finding indicates moderate variation in the MRP of individual medicines. Highest-priced products were sold at 1.83 times their international reference price, with similar variation across individual medicines as observed with the lowest-priced generics. Out of the highest-priced and lowest-priced products of nine medicines in the private sector, highest-priced products cost 24.5% more, on an average, than their lowest-priced equivalents. In NGO/mission sector facilities, medicines were found to cost 2.08 times their international reference price. However, results are based on four medicines only due to low availability of surveyed medicines in this sector. When the prices of these four medicines were compared with those in the private sector, they were found to cost 12.4% more. Out of 34 medicines surveyed, the price of some medicines showed substantial variation across individual private sector outlets.

Most of these medicines belong to the antimicrobial class. Out of these medicines, amoxicillin + clavulanic acid preparations showed maximum price variation [Table 5].

Discussion

In the public sector of Odisha, medicines are procured centrally by the state government and are made available to all patients free of cost. Results of the survey indicate that most of surveyed medicines had poor availability in public sector outlets. The high standard deviation associated with mean

Table 2:

Comparison of mean availability (%) of all surveyed medicines on the day of data collection, in three different sectors of Odisha

|                      | Public sector (n=79 outlets) | Private sector (n=79 outlets) | NGO/Mission sector (n=5 outlets) |
|----------------------|-----------------------------|------------------------------|----------------------------------|
|                      | Highest-priced product      | Lowest-priced product        | Highest-priced product           | Lowest-priced product          | Highest-priced product          | Lowest-priced product          |
| Mean availability ±  | 0.0%                        | 17.0% (±26.3%)               | 10.8% (±17.9%)                  | 38.5% (±31.6%)                 | 0.0%                            | 21.8% (±30.9%)                 |
| (standard deviation) |                             |                              |                                 |                                |                                |                                |

Only one product for each medicine was available at public and other sectors
Table 3:
Comparison of the availability of individual medicines, in three different Health Sectors of Odisha

| Percentage availability of different medicines | Public sector (n=79 outlets) | Private sector (n=79 outlets) | NGO/mission sector (n=5 outlets) |
|-----------------------------------------------|-----------------------------|-------------------------------|---------------------------------|
| <25%                                          | Ofloxacin tab (200 mg), ORS (1 l) | Chloroquine syrup, ondansetron syrup, ofloxacin tab, ORS (1 l), albendazole susp, paracetamol susp | Albendazole susp, chloroquine syrup, ORS (1 l), paracetamol susp |
| 25-50%                                        | Paracetamol susp, salbutamol inhaler, albendazole susp | Amoxicillin + clavulanic acid susp, salbutamol inhaler, vit A susp, prednisolone susp, azithromycin tab, ORS (200 ml) | Amoxicillin susp, ondansetron susp |
| 50-75%                                        | Amoxicillin susp, co-trimoxazole susp, chloroquinesusp | Amoxicillin + clavulanic acid tab, gentamycin inj, amoxicillin susp and dispersible tab, artemether + lumefantrine dispersible tab, valproic acid oral liquid, paracetamol tab, ibuprofen tab | Azithromycin tab, ofloxacin tab, benzyl benzoate lotion |
| 75%                                           | Azithromycin dispersible tab, beclomethasone susp, ferrous sulphate susp, vit A susp, zinc dispersible tab, amoxicillin dispersible tab, chloramphenicol powder for inj, ibuprofen tab, ondansetron susp, procaine penicillin inj, isoniazid + rifampicin + pyrazinamide dispersible tab, benzylpenicillin inj, paracetamol susp, benzyl benzoate lotion, gentamycin inj | Diazepam rectal solution, beclomethasone susp, zinc dispersible tab, ferrous sulphate susp, benzyl benzoate lotion, benzylpenicillin inj, isoniazid + rifampicin + pyrazinamide dispersible tab, phenobarbital inj, procaine penicillin susp, carbamazepine dispersible tab and susp, phenytoin susp, co-trimoxazole susp | Chloramphenicol powder for inj, phenobarbital inj, co-trimoxazole susp, gentamycin inj, valproic acid oral liquid, amoxicillin + clavulanic acid dry susp, ORS (200 ml) |

<25%                                           | Amoxicillin + clavulanic acid dry susp, amoxicillin + clavulanic acid tab, artemether + lumefantrine dispersible tab, carbachemazepine susp and chewable tab, diazepam rectal solution, ORS (200 ml), phenobarbital inj, phenytoin susp, prednisolone susp, valproic acid oral liquid | Chloramphenicol powder for inj, phenobarbital susp, co-trimoxazole susp, gentamycin inj, valproic acid oral liquid, amoxicillin + clavulanic acid dry susp, ORS (200 ml) |

Table 4:
Comparison of ratio of median unit prices between public and private sector

| Sector     | Medicine type (n=14) | Median MPR | 25th percentile | 75th percentile |
|------------|----------------------|------------|-----------------|-----------------|
| Public     | Lowest priced products | 0.52       | 0.39            | 0.74            |
| Private    | Low-priced Products (n=23) | 1.46       | 1.06            | 2.29            |
| Private    | High-priced Products (n=9) | 1.83       | 1.57            | 2.67            |

MPR = Medicine price ratio

availability (17 ± 26.3) suggests high variation in availability of these vital medicines across the public health outlets. The study also reveals that availability of medicines with central procurement agency is not matching with medicine availability at secondary or primary care outlets. This suggests that drug supply chain management is not efficient apart from inadequate procurement of medicines for the children. Given the low availability of medicines in the public sector, it can be derived that most patients are purchasing medicines from the private sector or going without medicines in a state with documented high child mortality. Our findings also match with that of Chhattisgarh, the state in which similar study was undertaken as a part of “better medicines for children project in India.” Availability of children’s medicine was 17% in both public and other sectors of Chhattisgarh. The Chhattisgarh survey has revealed that out of 50 child medicines surveyed for the state, 29 medicines were not available in any of the facilities. Low availability of medicines in the present study also match with other south East Asian regions. A study in Shaanxi Provinces of China has shown that mean availability of originator brand and generic medicines in the public sector were 7.1% and 20.0%, respectively. A similar study at Sri Lanka has also proved that treatment for chronic illnesses requiring liquid or inhaled dosage forms were not available or affordable.

For treatment of malaria, which contributes to significant morbidity and mortality of children in the state, the government is procuring only chloroquine syrup which was available in 42.7% of outlets. Unfortunately key antimalarial medicine artemisinin combination therapy ACT (artemether + lumefantrine) was
Table 5:

Medicines showing large price variations across outlets in private sector

| Medicine name               | Medicine type | Median MPR | 25th percentile | 75th percentile | % difference between percentiles |
|-----------------------------|---------------|------------|-----------------|-----------------|---------------------------------|
| Ofloxacin tab               | Lowest-priced | 2.15       | 1.89            | 2.83            | 50                              |
| Azithromycin dispersible tab| Lowest-priced | 1.47       | 1.20            | 1.86            | 55                              |
| Phenobarbital inj           | Lowest-priced | 2.67       | 1.70            | 2.71            | 60                              |
| Albendazolesusp             | Lowest-priced | 1.27       | 1.27            | 2.41            | 91                              |
| Amoxicillin susp            | Lowest-priced | 3.83       | 2.26            | 4.52            | 100                             |
| Amoxicillin + clavulanic acid dis. Tab | Highest-priced | 0.94   | 0.79            | 1.88            | 139                             |
| Amoxicillin + clavulanic acid dis Tab | Lowest-priced | 1.29   | 0.65            | 1.75            | 170                             |

MPR=Medicine price ratio, Dis Tab=Dispersible Tablet

available in only 39% of private sector outlets of Odisha. The current need is to procure ACT in appropriate child-specific dosages to reduce the high mortality rates of children due to the high prevalence of falciparum malaria in this state. Good availability of ORS in public facilities may be due to the efficient procurement or less utilization. Dispersible tablets of zinc are not procured by the Government of Odisha, and their availability is only 2.4%, which is purchased locally by few district authorities. The high availability of ofloxacin and 1 L ORS in more than 90% government outlets suggest that one efficient system for drug supply is existing in the state. This system can be exploited to supply other essential medicines or consumables.

Branded generic medicines dominate the private sector of Odisha. Rare availability of innovator branded products may be due to low paying capacity of people. The private sector patient prices were higher than international reference prices, with median MPRs of 1.46 and 1.83 for the lowest-priced and highest-priced products, respectively. Usually, medicines are not found to be priced consistently with respect to their international reference price.118-29 The range (interquartile) of MPRs in the private sector; shows the variability in the medicine price across medicine outlets. This high variability of price between private sector outlets is likely the result of low market competition and the absence of proper price regulation. In India, because of predominant branded generic market, drug products are available in various strength and formulation as per the marketing strategy of the pharmaceutical companies. Many international studies also have revealed that it’s very difficult to maintain uniform drug price.21-23 High variation of the cost for some medicines Table 5 also suggests that private facilities are keeping, medicine product of their own choice to gain maximum financial benefit. Thus, Government through regulatory authorities needs to import more child-specific formulations with strict price regulation. The strategic policy is needed to be kept in place to keep selected essential life-saving medicines for children in all medicine outlets.

This standard methodology has allowed the estimation of medicine prices and availability in a reliable and standardized way that enables valid international comparisons. A further strength of the methodology is the multiple steps taken to ensure data quality control checks. The only limitation of this work is that availability is determined for the selected list of survey medicines and, therefore, does not account for the availability of alternate strengths or dosage forms, or of therapeutic alternatives. Looking at the poor availability of medicines and low procurement price in the public sector, it was recommended that Government of Odisha should prepare a separate essential medicine list for children and procure these medicines on an urgent basis. The results of this study provided broad directions for future research and action.

Conclusion

The results of this study suggest that availability of child-specific medicines is extremely poor in all the three sectors of Odisha state. The price patients pay for purchasing children’s medicine is relatively high both in private and other sector outlets. Thus, appropriate policies need to be implemented to make the child-specific medicines available in Odisha.

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Conflicts of Interest

There are no conflicts of interest.

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