Research Article

Cross-sectional study on availability and affordability of some essential child-specific medicines in Uttar Pradesh

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Abstract

Background: Uttar Pradesh ranks fourth highly populous state of India and having about 14.9% population of age ≤5 years. The state records very high mortality of children. Continuous availability of affordable medicines in appropriate formulations is essential to reduce morbidity and mortality in children.

Objective: The study aims at documenting the availability and affordability for purchasing essential child-specific medicines in the state of Uttar Pradesh, India.

Materials and Methods: The survey of ten essential medicines was conducted in six randomly selected districts of Uttar Pradesh. Data were collected from medicine outlets of the public, private, and other sector (Nongovernmental Organization [NGO]/mission sectors) of all six randomly selected districts, using survey questionnaire.

Results: Both public sector and NGO/mission 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 low-priced medicines for a particular drug product was 10.8% and 38.5%, respectively. ORS (for 1L) and paracetamol suspension (antipyretic-analgesic group) was widely available with more than 90%, nearly more or less in all three sectors. Availability of antibiotics was consistently less in most of the outlets except cotrimoxazole suspension (81.9%) in public sector and amoxicillin + clavulanic acid dry syrup (53.7%), azithromycin syrup (68.3%) in public sector.

Conclusion: The availability of children's medicines in public sector facilities of Uttar Pradesh state is poor. Medicines for children cost relatively high in private sector. The availability of medicines should be improved on an urgent basis to improve access to medicines for children.

KEY WORDS: Children, availability, affordability, essential medicines

Introduction

Children represent the future, and ensuring their healthy growth and development ought to be a prime concern of all societies. Newborns are particularly vulnerable and children are vulnerable to malnutrition and infectious diseases, many of which can be effectively prevented or treated.[1] More than half of the deaths in children are caused by diseases that could be treated with safe, essential, and child-specific medicines. An estimated 9 million children worldwide die each year from preventable and treatable causes. More than half of these deaths are caused by diseases which could be treated with safe, child-specific medicines: acute respiratory infections (including pneumonia) (17%), diarrheal diseases (17%), severe neonatal infections (9%), malaria (7%), and HIV/AIDS (2%).[2] The continuous availability of affordable medicines is a key factor to reduce infant mortality.[3] 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.[4] Public health facilities provide about 90% of medical care, and the organized private sector is very thin for the states. Despite the peoples' reliance on the public system, evidence has highlighted huge gaps and has suggested that institutions do not operate at optimal levels.[5–7] Although today's patients are highly health conscious and know importance of health, many a times in rural and semiurban

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town due to lack of knowledge and medical care resources, non-availability of medicines and high amount of money required for treatment, patient face many problems.[8] Uttar Pradesh is the fourth largest Indian state by area. According to census 2011, it is the most populous state in the country as well as the most populous country subdivision in the world.[9] Uttar Pradesh is having 14.9% of country's child population. The child health care was always a focusing issue for health sector as well as for the society. The price perception strongly influences whether customers were satisfied with their purchases and whether they would make future purchases.[10] It decides more or less the affordability criteria. The need for improvement of the facilities for health care for children is the prime concentration of the study. Multiple independent data sources were used and the capture–recapture method was applied to estimate the completeness of ascertainment of the survey.[11] The present study aims at exploring the availability of different essential child-specific formulations and affordability of these medicines in different health sectors of Uttar Pradesh.

Materials and Methods

This observational cross-sectional study was conducted to find out the status of availability of child-specific medicines in the state of Uttar Pradesh. The survey used a simple direct-contact methodology for measuring medicine availability. The survey work was conducted in six randomly selected districts of Uttar Pradesh (Lucknow, Kanpur, Meerut, Gorakhpur, Varanasi, and Jhansi) from different geographical and demographic locations of the state. The study carried out in specifically three sectors viz. government sector, private sector, and NGO/missionary sector. Three types of respondents were surveyed from these sectors: first, patients visiting hospitals and chemist shops (government sector); second, registered medical practitioner and retailers selling medicines (private sector), and third, service providers for social service such as charitable hospitals/nursing homes, and so on (NGO/missionary sector).

Selection of Survey Area

In each district, the major urban health center was selected as one central area, and 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, five primary health centers, three community health centers, one district headquarter hospital, and one medical college hospital were included that constituted 10 sample areas for the survey. Similarly, the private sector clinics of RMPs (Registered Medical Practitioner), other private hospitals, and retail pharmacy counters (medical stores), with a total of 10 sample areas were surveyed. In nongovernmental organization (NGO)/mission sector, dispensaries and charitable health counters were surveyed. Thus, 25 outlets were surveyed in each of the public and private sectors and five outlets were surveyed in the NGO/mission sector (other sector).[12]

Data Collection

A simple survey form was prepared for the study. All survey personnel received training on the survey methodology and data collection/data entry procedures opted for the study. Some personal contacts were also utilized to get the data conveniently.

Selection of Medicines

A total of ten child-specific formulations covering common therapeutic classes [Table 1], that is, antibiotics (cotrimoxazole suspension, amoxicillin + clavulanic acid suspension, gentamicin injection, and azithromycin syrup), antipyretic–analgesic (paracetamol suspension and ibuprofen suspension), antiemetics (ondansetron syrup/suspension), antianemia (ferrous salt drops), antidiarrhea (oral rehydration solution [ORS, for 1 L]), and vitamin A were selected. The basis of selection was that these medicines were included in National Rural Health Mission (NRHM) list of medicines as well as listed in WHO Model EMLc. A discussion was also done before the selection of medicines and the final selection was on recommendations of the committee that was engaged in the study.

Data Entry and Statistical Analysis

Availability of different surveyed medicines was entered into the MS Excel Workbook. The data were represented as summary statistics and availability was described as median availability with range. Total availability was calculated as the percentage of number of medicines (out of the total selected medicines) available in each center.

Results

Among surveyed medicines ORS (1 L), paracetamol suspension and cotrimoxazole suspension were found with >75% availability in public sector; ORS (1 L), paracetamol suspension and ondansetron syrup in private sector and ORS (1 L), paracetamol suspension in NGO/mission sector. While Vitamin A was found with between 50% and 75% availability in public sector; Amoxicillin + clavulanic acid syrup, azithromycin syrup in private sector, and ondansetron syrup in NGO/mission sector. About 25%–50% availability was found for ferrous salt drops in public sector; gentamicin injection, ibuprofen suspension, cotrimoxazole suspension, and vitamin A in public sector; and azithromycin syrup, cotrimoxazole suspension in NGO/mission sector. Gentamicin injection was found within 5%–25 % availability in public sector outlets; while gentamicin injection, amoxicillin + clavulanic acid dry syrup, ibuprofen suspension and vitamin A in NGO/mission sector. Amoxicillin + clavulanic acid dry syrup, ibuprofen suspension, ondansetron syrup, and azithromycin syrup was not available in many of the public sector outlet (with <5% availability) at the day of survey, while ferrous salt drops were found missing in private as well as NGO/mission sector outlets (Table 1).

ORS (for 1 L) and paracetamol suspension (antipyretic–analgesic group) was widely available with more than 90%,

Table 1: Comparison of the availability of individual medicines, in three sectors

Availability (%)	Public sector (*n* = 10 Outlets)	Private sector (*n* = 10 Outlets)	NGO/mission sector (*n* = 5 outlets)
>75%	ORS (1 L), paracetamol susp., cotrimoxazole susp.	ORS (1 L), paracetamol susp., ondansetron syrup	ORS (1 L), paracetamol susp.
50%–75%	Vit A	Amoxicillin + clavulanic acid syrup, azithromycin syrup	Ondansetron syrup
25%–50%	Ferrous salt drops	Gentamicin inj, ibuprofen susp., cotrimoxazole susp., vit. A	Azithromycin syrup, cotrimoxazole susp.
5%–25%	Gentamicin inj.	-	Gentamicin inj, amoxicillin + clavulanic acid dry syrup, ibuprofen susp.,vit. A
<5%	Amoxicillin + clavulanic acid dry syrup, ibuprofen susp., ondansetron syrup,azithromycin syrup	Ferrous salt drops	Ferrous salt drops

Table 2: Availability of individual medicines by therapeutic class and sector

Medicine name	Therapeutic group	Public sector (*n* = 10)	Private sector (*n* = 10)	NGO/mission sector (*n* = 5)
Cotrimoxazole susp.	Antibiotics	81.9%	46.3%	25%
Amoxicillin + clavulanic acid susp.	Antibiotics	1.2%	53.7%	14.3%
Gentamicin injection	Antibiotics	19.5%	31.7%	20%
Azithromycin syrup	Antibiotics	1.2%	68.3%	25%
Ondansetron syrup/susp.	Antiemetics	3.7%	89%	60%
Oral rehydration solution (for 1 L)	Antidiarrhea	95.8%	95.0%	100%
Paracetamol susp.	Antipyretic–analgesic	95%	92.7%	90%
Ibuprofen susp.	Antipyretic-analgesic	3.7%	26.7%	12%
Vitamin A	Vitamins	52.4%	45%	17.5%
Ferrous salt drops	Antianemia	26.4%	4.9%	1.2%

Table 3: Comparison of mean availability (%) of all surveyed medicines on the day of data collection, in three different sectors of Uttar Pradesh

	Public sector (*n* = 10)		Private sector (*n* = 10)		NGO/mission sector (*n* = 5)	
	Highest priced product	Lowest priced product	Highest priced Product	Lowest priced product	Highest priced product	Lowest priced product
Mean availability (standard deviation)	0.0%	17.0% (±26.3%)	20.8% (±17.9%)	38.5% (±31.6%)	1.0%	21.8% (±30.9%)

nearly more or less in all three sectors. In antipyretic–analgesic therapeutic group, availability of ibuprofen suspension was comparatively lower than paracetamol suspension, as in 3.7% public sector counters, 26.7% in private sector, and 12% in NGO/mission sector.

Ferrous salt drops in antianemia group were available in 26.4% public sector outlets, 4.9% in private sector, and 1.2% in NGO/mission sector outlets.

Availability of antiemetics ondansetron syrup/suspension was 3.7% in the public sector, 89% in the public sector, and 60% in NGO/mission sector. Availability of vitamin A was 52.4% public stores, 45% in private counters, and 17.55% in NGO/mission sector (Table 2).

Availability of Antibiotics was consistently less in most of outlets except cotrimoxazole suspension (81.9%) in public sector and amoxicillin + clavulanic acid dry syrup (53.7%), azithromycin syrup (68.3%) in public sector (Figure 1).

The survey revealed that public sector availability was low at 17.0% with very high deviation in availability (±26.3) with the exception of ORS (for 1 L) and paracetamol suspension. Branded products were commonly available in private sectors and NGO/mission sector of Uttar Pradesh. In the private sector,

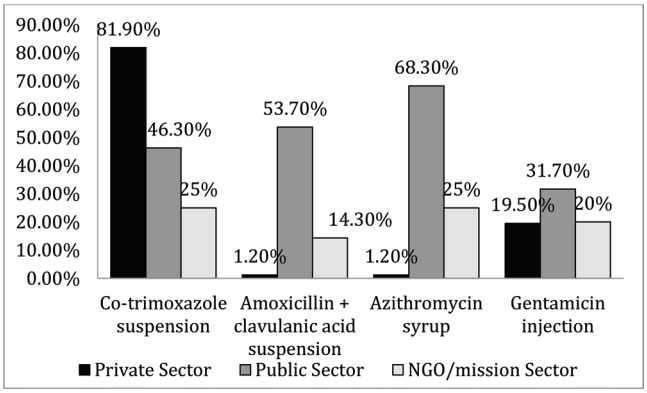

Figure 1: Availability of selected antibiotics in public, private, and NGO/mission sector.

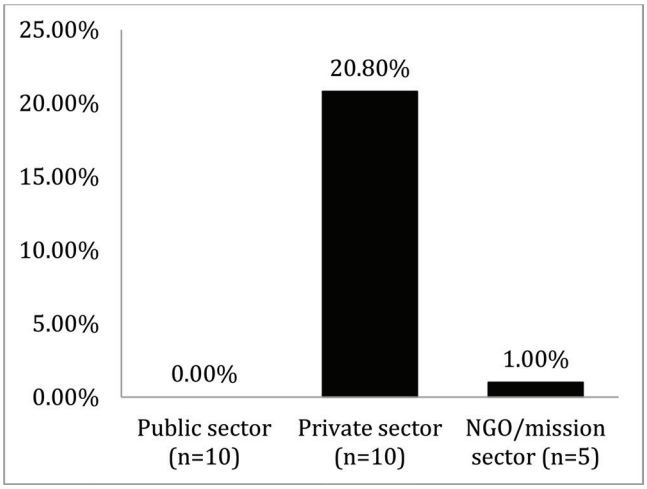

Figure 2: Average availability of the highest priced versions of ten pediatric medicines in different sectors.

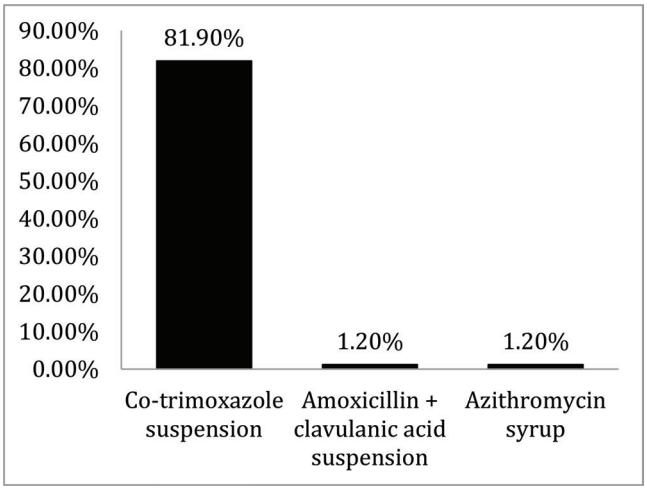

Figure 3: Average availability of the lowest priced versions of ten pediatric medicines in different sectors.

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 3). High-priced branded generic products were also found in the private sector, with an average availability of 20.8% (Figure 2). Availability of lowest priced generic medicines in NGO/mission sector facilities was found out to be 21.8% [Figure 3]. Only one drug product (no substituent) was available at a particular time in both public sector and NGO/mission sector outlets.

Discussion

In the public sector of Uttar Pradesh, 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 the surveyed medicines had poor availability in public sector outlets. The high standard deviation associated with mean availability (17 ± 26.3) suggests high variation in availability of these vital medicines across 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 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 and Odisha, the states in which similar study was undertaken as a part of "better medicines for children project in India." Availability of children's medicine was approximately 17% in both public and other sectors of Chhattisgarh and Odisha.[13,14] Low availability of medicines in the present study also match with other southeast Asian regions.[15–21] A study conducted in Shaanxi Provinces of China has shown that the mean availability of original brand and generic medicines in the public sector was 7.1% and 20.0%, respectively.[22] A similar study at Srilanka has also proved that treatment for chronic illnesses requiring liquid or inhaled dosage forms were not available or affordable.[17]

Good availability of ORS in public facilities may be due to the efficient procurement or less utilization. The high availability of cotrimoxazole suspension and 1 L ORS in more than 90% government outlets suggests that one efficient system for drug supply exist in the state. This system can be exploited to supply other essential medicines or consumables.

Branded generic medicines dominate the private sector of Uttar Pradesh. Rare availability of innovator branded products may be due to low paying capacity of people.[23] In India, because of predominant branded generic market, drug products are available in varying strength and formulation as per the marketing strategy of the pharmaceutical companies. Many international studies also have revealed that it is very difficult to maintain uniform drug price.[24–26]

A strategic policy is needed to be kept in place to keep selected essential lifesaving medicines for children in all medicine outlets.

This survey methodology has allowed the estimation of medicine affordability and availability in a reliable and standardized way that enables valid international comparisons. 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 the government of Uttar Pradesh 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 the availability of child-specific medicines is extremely poor in all the three sectors of Uttar Pradesh. The price patients pay for purchasing children's medicine is relatively high both in private and other sector outlets affecting the affordability very much. Thus, appropriate policies need to be implemented to make the child-specific medicines available and affordable in Uttar Pradesh.

References

1. WHO_Child Health (http://www.who.int/topics/child_health/en/)
2. Make Medicines Child Size. Geneva, World Health Organization, 2011. Available at: http://www.who.int/childmedicines/en/ (last accessed on March 2012).
3. Millennium Development Goals. Available at: http://www.who.int/topics/millennium_development_goals/child_mortality/en/index.html (last accessed on March 04, 2013).
4. UNICEF India – Orissa. Available at: http://www.unicef.org/India/overview_4346.htm (last accessed on February 06, 2013).
5. National Sample Survey Office. Ministry of Statistics and Programme Implementation of the Government of India, New Delhi; 2006.
6. International Institute for Population Sciences. National Family Health Survey (NHFS-3) Report 2005-2006. Mumbai: International Institute for Population Sciences; 2006.
7. Singh PV, Tatambhotla A, Kalvakuntla R, Chokshi M. Understanding public drug procurement in India: a comparative qualitative study of five Indian states. BMJ Open 2013;3. pii: e001987.
8. Bejon Misra A Study on Availability and Prices of Medicines in India, 2002. Available at: http://www.nppaindia.nic.in/report/voicerep.html (last accessed on Jan 28, 2016).
9. Uttar Pradesh: Wikipedia. Available at: https://en.wikipedia.org/wiki/Uttar_Pradesh (last accessed on Feb 20, 2016).
10. Pujari NM. Indian consumer's buying behaviour and perception to herbal drugs: a report. Intl J Progr Pharmacy 2015;1(1):11–19.
11. Sachan AK, Pujari NM. A survey on behavior of diabetes patients in Kanpur south-Uttar Pradesh, India. Ann Pharma Res 2014; 2(02):66–9.
12. "Better Medicines for Children Project" Overview of Methods for Medicines Availability and Pricing Surveys; September, 2009. Available at: http://www.who.int/childmedicines/progress/ChildMeds_pricing_surveys (last accessed on February 07, 2013).
13. Study of Availability and Pricing of Children's Medicine in Chhattisgarh. Available at: http://www.who.int/childmedicines/countries/PRICING_CHHATTISGARH.pdf (last accessed on March 10, 2013).
14. Swain TR, Rath B, Dehury S, Tarai A, Das P, Samal R, et al. Pricing and availability of some essential child specific medicines in Odisha. Indian J Pharmacol 2015;47:496–501.
15. Babar ZU, Izham M, Ibrahim M, Bukhari NI. Medicine utilization and pricing: the findings of a household survey in Malaysia. J Generic Med 2005;3:47–61.
16. Balasubramaniam R, Beneragama BV, Sri Ranganathan S. A national survey of availability of key essential medicines for children in Sri Lanka. Ceylon Med J 2011;56:101–7.
17. Balasubramaniam R, Benaragama BV, Sri Ranganathan S. A national survey of price and affordability of key essential medicines for children in Sri Lanka. Indian J Pediatr 2014;81:362–7.
18. Gitanjali B, Manikandan S. Availability of five essential medicines for children in public health facilities in India: a snapshot survey. J Pharmacol Pharmacother 2011;2:95–9.
19. Tripathi SK, Dey D, Hazra A. Medicine Prices and Availability in the State of West Bengal, India; 2005. Available at: http://www.haiweb.org/medicineprices/surveys/2004121W/survey_report.pdf (last accessed on March 04, 2013).
20. Babar ZUD, Izham M, Ibrahim M, Singh H, Bukahri NI, Creese A. Evaluating drug prices, availability, affordability, and price components: implications for access to drugs in Malaysia. PLoS Med 2007;4: e82.
21. Kotwani A. Medicine Prices in the State of Rajasthan, India. Survey Report; 2006. Available at: http://www.haiweb.org/medicineprices/surveys/200306IN/survey_report.pdf (last accessed on March 03, 2013).
22. Wang X, Fang Y, Yang S, Jiang M, Yan K, Wu L, et al. Access to paediatric essential medicines: a survey of prices, availability, affordability and price components in Shaanxi Province, China. PLoS One 2014;9:e90365.
23. Child Specific Medicines, Availability and Affordability in Ghana; September, 2010. Available at: http://www.who.int/childmedicines/countries/Pricing_GHANA (last accessed on March 04, 2013).
24. Australian Government Productivity Commission. International Pharmaceutical Price Differences, Research Report. Canberra; 2001. Available at: http://www.pc.gov.au/study/pbsprices/finalreport/pbsprices.pdf (last accessed on March 04, 2013).
25. Zulkefli AS. Move to Cap Prices of Essential Medicines. New Strait Times; 2006. Available at: http://www. 202.144.202.76/new_mps/cfm/localnews_view (last accessed on March 04, 2013).
26. Sangaralingam M, Raman M. The High Cost of Private Monopolies 2003. Original Report, Malaysia; 2003. Available at: http://www.plosmedicine.org/article/fetchObjectAttachment; jsessionid (last accessed on March 11, 2013).

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