Strengthen health systems to achieve the SDG targets for healthy children: Evidence on access to medicines situation in Nepal

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Child and adolescent (C&A) health is a crucial indicator of future human capital, societal gains, and individual prosperity. The 2030 Sustainable Development Goals (SDGs) focus on several targets for improving C&A health, including food security, education, reducing child mortality, and ensuring universal access to immunizations and healthcare.¹

Towards health-related SDGs (SDG-3), countries through disease control and improved immunization have made remarkable progress by reducing child mortality by >50% from 13.8M (1990) to 6.6M (2017).² Nonetheless, in 2019, estimated 5.2M under-five and 50,000 older children (aged 5–9 years) succumbed to preventable and treatable diseases.³ Disability-adjusted life years also remain substantial (~145M), with disproportionately high burden in low socioeconomic regions.²

COVID-19 further decelerated the efforts and progress-tracking towards SDG-3, particularly by disrupting essential healthcare (Target 3.8). A World Health Organization (WHO) survey inquiring continuity of essential healthcare reported that the pandemic affected health systems in nearly all the 135 surveyed countries at varying levels.⁴ Access to essential healthcare is particularly affected for vulnerable populations, and South Asia is among the most affected regions. To achieve SDG-3, policymakers must explore health system capacity and access situation before the pandemic (pre-COVID-19 baseline data).

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Nepal—a low-income country with 40% population aged <18 years—faces major challenges relating to the high C&A disease burden and limited healthcare access (Figure 1).^{5,6} About 18,700 children (31/1000 live births) die annually before their fifth birthday. The child mortality is as high as 69.4/1000 live births in geographically remote areas, e.g., Sudurpashchim province, with sub-optimal healthcare.⁷ Limited availability of affordable essential medicines for children (EMc) contributes to child mortality. However, access factors remain inadequately understood in countries with poorer health systems, including Nepal.

Using WHO/Health Action International (WHO/ HAI) methodology, we assessed availability, prices, and affordability of 20 EMc in six public-sector hospitals and 32 private-retail pharmacies in Kathmandu Valley, Nepal. To compare access to EMc with the overall medicines access situation, we also collected data on 14 'core' medicines that are essential to treat common illnesses and are noted as representative by the WHO/HAI. For both the public and private sectors, we report availability as the percentage of surveyed facilities where a medicine was physically available in stock on the day of survey. The WHO targets 80% availability of essential medicines in all the sectors. Given that the medicines in the Nepalese public sector are provided free-of-cost to the patients, we report price and affordability analysis only for the private-sector medicines. A medicine was considered 'unaffordable' if the lowest-paid worker would need to spend >1 day's wage to buy a weekly (acute) or monthly supply (chronic).⁶ See table S1 for details.

The mean availability of surveyed EMc was 61.3% in the public-sector hospitals and 60.6% in the privateretail pharmacies, both falling short of WHO's 80% availability target. While the private-retail availability of WHO 'core' medicines was slightly higher (66.8%), that for EMc was similarly low in both sectors. Notably, even the medicines needed to treat diseases that cause The Lancet Regional Health - Southeast Asia 2022;4: 100042 https://doi.org/10.1016/j. lansea.2022.100042



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Leading causes of child and adolescent mortality (aged <20 years): Nepal vs. South Asia

South Asia encompasses Alghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. The figure shows diseases that contribute to ≥1% of deaths in individuals aged <20 years in Nepal using Global Burden of Disease's (GBD) most detailed cause-of-deaths classification (level 3); data were derived from GBD Study, Institute of Health Metrics and Evaluation (http://ghdx.healthdata.org/gbd-results-tool).

Figure 1. Leading causes of C&A mortality in Nepal vs. South Asia.

the highest C&A mortality in Nepal had sub-optimal availability, including zinc sulphate (diarrhoea), artemether/lumefantrine (malaria), and cotrimoxazole (complicated infections). EMc—including lifesaving medicines like salbutamol and beclomethasone inhalers—were unaffordable in the local context. On average, the lowest-paid worker would spend 1.5 days' wages to purchase a given EMc supply (Table I).

To understand the adoption of WHO-recommended essential medicines that are needed to treat the leading causes of C&A mortality in Nepal (pneumonia, malaria, and diarrhoea), we compared the medicines listed in the WHO's 2021 Essential Medicines List for Children (EMLc) with those in Nepal's national EMLs (N-EML 2021 and 2016) and free-drug formularies of district hospitals, primary health centres, and health-posts. N-EMLs were compared as Nepal lacks a specific EMLc. Although N-EML (2021) includes about 81% of the medicines listed in WHO EMLc, much fewer appeared on the free-drug formularies of district hospitals (24%), primary health centres (21%), and health posts (13%). [Table S2]

Our findings highlight the suboptimal readiness of Nepal's health systems to deliver EMc. Previous studies report lower medicines availability in Nepal's public-sector compared to the private sector.^{6,8} Although we observed this trend for WHO 'core' medicines, the availability of EMc was similarly low in both the sectors. This could partly be explained by lack of EMLc in Nepal.

Despite seven editions of WHO's EMLc published during 2007-2019 and several relevant campaigns ("Better Medicines for Children" and "Make Medicines Child Size"), many LMICs lack an EMLc.9 Children, being a heterogenous group, require age-appropriate formulations and strengths that largely differ from those for adults. Therefore, Nepal must develop a local disease burdenspecific EMLc that prioritizes paediatric posology. Nepal's 2021 EML included a higher proportion of medicines recommended in the WHO EMLc. Nevertheless, expanding the EML introduces challenges in procurement, especially in countries with limited domestic pharmaceutical manufacturing capacity. To ensure EML/EMLc serve their purpose of improving access and rational use of medicines, local governments must allocate adequate budgets for procurement, optimize supply chains for uninterrupted delivery, and establish committees that regularly update EMLs and monitor prices and availability.^{6,10} Given the poor access to healthcare, inadequate budgeting, limited insurance coverage, and consequently high out-of-pocket expenditure hinder universal health coverage. Furthermore, improved medicine-need forecasting, efficient health technology assessment processes, and pooled procurements could help the Nepalese government to optimize procurement and design of free-drug formularies, allowing increased value for money.^{IC}

As we only surveyed those medicines that are listed on both the WHO EMLc and Nepal's N-EML, paediatric

Medicine	Availability		MPR i.e., ratio of	Number of day's
	Private-sector retail pharmacy (N=32)	Public-sector hospital (N=6)	median consumer price to international reference price (Private-sector) [¥]	wages to afford treatment in private-sector retail pharmacies
Amitriptyline 25 mg cap/tab [‡]	94·1%	83·3%	4-3381	1.61
Amoxicillin 500 mg cap/tab [⊨]	100%	100.0%	2.5658	0.53
Ceftriaxone Inj 1 g vial 🖡	70·6%	100.0%	1.9757	5-40
Co-trimoxazole suspension 8+40 mg/ml	29·4%	50·0%	1.6788	0.58
Diazepam 5mg cap/tab [⊨]	8·8%	33.3%	-	0.82
Omeprazole 20 mg/ml [⊨]	100%	66·7%	-	0.13
Paracetamol suspension 24mg/ml	100%	83.3%	-	-
Salbutamol inhaler 100 mcg/dose 🛓	97.1%	83.3%	1.0528	1.14
Azithromycin 250 mg tab	94·1%	100.0%	1.3934	0.67
Benzathine Benzylpenicillin Powder for inj 900 mg	2.9%	16·7%		-
Albendazole 400 mg (chewable) tab	100.0%	100.0%	4.3788	0.33
Acyclovir 200 mg tab	73.5%	100.0%	3.1582	0.72
Metronidazole (as benzoate) suspension 200 mg /5 ml	91·2%	83.3%	1.4207	0.27
Rifampicin 300 mg tab	8.8%	0.0%	-	1.59
Zinc sulphate 20 mg tab/ powder	67:6%	66.7%	2.7204	0.26
Oral rehydration salts powder for dilution: 500 ml pack	100:0%	100.0%	1.7278	-
Gentamicin Eve drops: 0:3% in 5 ml bottle	32.4%	16.7%	0.3358	0.01
Sodium Valproate cap/tab 200 mg	76.5%	66.7%	0.8589	6.59
Morphine Ini: 10 mg (sulfate or HCL) in 1-ml ampoule	0.0%	50.0%	-	-
Ranitidine cap/tab 150 mg	100:0%	83.3%	0.5003	0.34
Beclomethasone Inhaler: 50mcg per dose	32.4%	50.0%	1.9912	6.75
lbuprofen 400 mg tab	64·7%	50.0%	1.6253	0.85
Metformin 500 mg tab	100.0%	66·7%	1.2786	1.13
Dexamethasone Ini 4 mg/ml in 1ml ampoule	52.9%	100.0%	2.1310	0.27
Mercaptopurine 50 mg tab	2.9%	0.0%	-	_
Artemether + lumefantrine 20mg + 120 dispersible tab	0.0%	0.0%	-	
Retinol (Sugar coated tablet), 20,000 IU tab	0.0%	0.0%	-	
Vitamin B (Riboflavin) Complex tab	97.1%	66·7%	10.1707	-
Atenolol* 50 mg cap/tab	91.2%	66·7%	3.5849	0.82
Captopril* 25 mg cap/tab	58·8%	16.7%	2.6196	1.90
Ciprofloxacin* 500 mg cap/tab	70.6%	66·7%	2.0567	0.53
Diclofenac* 50 mg cap/tab	91.2%	66·7%	7.4585	0.99
Glibenclamide* 5mg cap/tab	20.6%	0.0%	-	0.48
Simvastatin* 20 mg cap/tab	2.9%	0.0%	-	0.66
Essential Medicines listed in the WHO EMLc 2021	Mean (SD):	Mean (SD):	Median MPR:	Mean no• of days'
(N=20)	60.6% (39.9%)	61·3% (35·2)	1.728	wages: 1·49
'WHO core' essential medicines (N=14)	Mean (SD):	Mean (SD):	Median MPR:	Mean no∙ of days′
	66·8% (36·4)	58.3% (33.8)	2.566	wages: 1·18
All Medicines Combined (Pediatric + 'WHO core')	Mean (SD):	Mean (SD):	Median MPR:	Mean no· of days'
	59.8% (38.9)	56.9% (35.8)	2.024	wages: 1·35

Table 1: Availability, prices, and affordability of adult and pediatric essential medicines in Nepal.

EMLc: Essential Medicines List for children; MPR: Median Price Ratio. [†] These medicines are listed in both WHO EMLc and 'WHO Core' Essential medicines list (identified by WHO/HAI methodology as those that represent the medicines access situation in a health system).

listed only in the 'WHO core' essential medicines list and not in the WHO EMLc.

WHO/HAI recommends that medicines should cost <4 times the international reference price.

https://www.msh.org/resources/international-medical-products-price-guide

According to WHO/HAI methodology, affordability is calculated for monthly supply of a given medicine. However, for antibiotics and intravenous injections, we calculated affordability for a week's supply.

All observed deviations from the WHO/HAI standards are highlighted in bold.

formulations for several medicines were omitted; thus, our findings may be an overestimate, and the medicine access situation for children might be much poorer. Further, we did not survey vaccines, which are essential yet remain underutilized in Nepal.¹¹

To conclude, access to C&A healthcare in Nepal is limited owing to low availability of EMc in both public and private sectors and poor affordability in the private sector. These data—serving as baseline for the WHO/SDG targets in Nepal—should be leveraged to inform local interventions aimed at improving access to essential medicines and to achieve the SDGs for C&A health.

Contributors

AS and SRM conceived the study idea. AS and SRM developed the research methodology and planned the field survey with input from GS. PK and DA provided inputs for survey planning and conducted survey data collection and entry with support from AS. AS, GS and SRM conducted the literature review, data analysis, and interpreted the study results. AS and GS (equal contribution authors) wrote first draft of the manuscript and edited the subsequent versions of manuscript to its final stages. All authors reviewed and approved the final manuscript. The views expressed in this article are of the authors and not necessarily of the institutions of their affiliations.

Declaration of interests

The authors declare no conflict of interest for the current study.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.lan sea.2022.100042.

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