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Access to essential medicines in low-resource settings: a systematic review

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ABSTRACT
Almost 2 billion people worldwide lack access to necessary medications. This indicates that for over 25% of the global population, vital medications are either inaccessible, unaffordable, unsatisfactory, or of poor quality. By presenting fresh research findings from low- and middle-income countries (LMICs), this supplement illustrates the consequences of inadequate access to medications and emphasizes contemporary solutions to increase access to vital medicines. These research provide answers to important concerns like: Can performance-based financing increase access to necessary medications? How much do pediatric cardiovascular therapies cost? Which nations' legal systems support widespread access to pharmaceuticals? To what extent do people use medications appropriately? Does equity suffer from subpar medications? Since critical medications are key to the Sustainable Development Goals and central to the pursuit of Universal Health Coverage, the answers to these concerns are crucial. In order to lower the cost of care, avoid increased pain and suffering, decrease the length of sickness, and prevent unnecessary impairments and deaths globally, access to reasonably priced, high-quality vital medications is needed. Health Systems Global's Medicines in Health Systems Thematic Working Group, a membership organization devoted to advancing health systems research and knowledge translation, developed this supplement. By highlighting recent achievements and difficulties in expanding access to quality-assured medications through health systems in LMICs, the five papers in the supplement deepen our understanding.

Keywords: *Access, medicines, drugs, pharmaceuticals, developing countries, public health, health system.*

1. INTRODUCTION

The pharmaceutical business is credited with saving lives by offering a variety of treatments for a wide range of illnesses. Therefore, it is possible to refer to the pharmaceutical sector as the "life liner" (Akhtar, 2013). [1]. The Indian pharmaceutical industry is in charge of creating, producing, and distributing pharmaceuticals, or pharmaceutical medications, that are either extensively recommended to patients or self-administered to diagnose, vaccinate, or treat ailments. Indian pharmaceutical companies sell medical devices in addition to branded and generic medications. The sector is separated into three groups: thousands of small-scale producers, a few hundred medium-sized businesses, and the top tier of significant local, foreign, and joint venture corporations (Chaudhuri & György, 1997). [2]. Generic medications, vaccines, over-the-counter (OTC) medications, biologics, biosimilars, contract research and manufacturing, active pharmaceutical ingredients (API)/bulk medications, and biologics are the main segments of the Indian pharmaceutical business. There are some unique features that make the Indian pharmaceutical sector stand out from the rest of the world. First, branded generics make up between 70% and 80% of the retail market. Second, due to factors including early investment opportunities and development capabilities, local players have benefited from commanding positions; last, fierce competition has kept pharmaceutical medicine prices low.

The Indian pharmaceutical industry seems to be adapting in the next years in order to thrive in a changing environment. The domestic pharmaceutical industry is expected to increase in size during the next ten years, according to the Indian Economic Survey 2021. The impact of important factors like rising disposable income, the sharp increase in middle-class households, the development of medical infrastructure, the entry of health insurance companies into the market, the increase in the prevalence of chronic diseases, the adoption of product patents, aggressive market penetration driven by relatively smaller businesses, and technological advancements will all contribute to this enormous growth. The Indian pharmaceutical industry is predicted to reach a total market value of USD 130 billion by the end of 2030 [3]. Additionally, the pharmaceutical industry was viewed as one of the few stocks on the stock exchange to profit from the Covid-19 pandemic's aftermath

The main cause of this is that many investors have invested in pharmaceutical and healthcare companies because they think these companies will conduct research and development to prepare for the current pandemic and any other catastrophic events in the future (Mittal & Sharma, 2021) [4].

India's National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) was formally launched in 2010 in response to the growing prevalence of non-communicable diseases (NCDs). By March 2016, the program had been expanded throughout the nation.7. Nevertheless, the program does not cover over 80% of NCD patients in India who seek treatment in the private sector. The control of hypertension, including but not limited to drug adherence, is not routinely maintained for these individuals.8. According to NFHS data from 2015–16, less than 8% of hypertension patients had their blood pressure under control.6. A new program, the India Hypertension Control Initiative (IHCI), was introduced in 2017 as a multi-partner initiative of the Ministry of Health & Family Welfare of the Government of India, the Indian Council of Medical Research (ICMR), the WHO Country Office for India, and Resolve to Save Lives in response to the low control rates and to enhance access to treatment services [5].

1.1 Aim of the study

Although it hasn't been properly defined or used, access is a crucial topic in health policy and health care research. While some authors define "access" as a patient's ability or willingness to use the health care system, others use it to describe the circumstances that influence admission. The ideas of Penchansky R. and Thomas J.W. (The concept of access: definition and relationship to consumer) served as the foundation for the theoretical framework for the study of access to medications.

2. METHODOLOGY

2.1 Study design

To determine the availability of 50 essential medications in ten chosen Puducherry public health faculties, a snapshot survey was created.

2.2 Study site and duration

The time frame for this study was March 2019–February 2020. The study was conducted in Puducherry, the largest district in the Pondicherry union territory, which has a sufficient number of medical facilities run by the federal and state governments.

2.3 Study population

Based on their direction, ten public health facilities were chosen as a sample. Simple random sampling was used to choose public health institutions. Nine primary health centers and one tertiary care hospital were chosen in total. Two primary health centers are run by the federal government, while seven of the nine primary health centers are run by the state government.

2.4 Selection of medicines for survey

In accordance with WHO and HAI (Health Action International) guidelines, a list of important medications to be surveyed was created [14]. A global list of 30 medications and a WHO-SEARO (South East Asia Region Origin) regional list of 20 medications are among the 50 important medications listed on the checklist. Twenty medications were chosen from India's 2015 National List of Essential Medicines (NLEM) to create the supplemental list. By choosing medications that are frequently used to treat common conditions at the primary care level and ought to always be available in primary health centers, a supplemental list was created [6-8]. The principal effects:

- Primary care facilities charge for essential medications.
- Essential medications receive higher reimbursement rates for inpatients than non-essential medications.
- Increased efficiency has been the main factor in the price reduction of important medications.
- More price transparency can be achieved by making pricing data available.
- Many primary care facilities have decoupled physician compensation and facility operating costs from prescribing, which lessens the incentives for overprescription.
- Because of quality standards, consumers are better protected and have higher faith in the caliber of medications.
- A greater understanding of the sensible use of medications.

2.5 Data collection

Every chosen medical facility had a one-time survey. Medical officials with the necessary training and qualifications collected the data. A pilot research was carried out to see whether data collecting was feasible. To prevent bias, a list of medications to be surveyed was kept private prior to visits to medical facilities. On the day of the study, pharmacists and medical officers observed the pharmacies of individual health facilities to gather data on the availability of 50 critical medications.

2.6 Data analysis

Microsoft Excel (Microsoft® Corp., Redmond, WA) was used to enter and analyze the data for each public health center independently. The individual facility's percentage availability for each of the 50 surveyed medications was determined by dividing the total number of surveyed medications by the number of surveyed medications available at the health facility. It was also determined what percentage of all surveyed health facilities had individual medications available (number of facilities with individual medications available divided by total number of surveyed health facilities) [9-10]. A percentage availability of >80% is regarded as high, whereas less than 30% is regarded as low. To evaluate the data, Microsoft Excel was used.

3. RESULTS

20,097 titles were found by the search (4291 PubMed records, 6707 Scopus entries, 1363 Science Direct records, and 7736 extra records from journals). 1240 abstracts were evaluated after duplicate and irrelevant records were eliminated. 1142 of these research were disqualified. Forty-five of the remaining 98 articles were eliminated because they did not explain medicine access or provide examples or a UK emphasis. Of the 53 publications, 17 focused on the UK, and 36 were comparative studies across multiple countries, examining the environment (rural versus urban, electricity availability, cold storage facilities, specialist equipment, etc.) in which healthcare is delivered.

Table 1 a: Comparison of Mean Baseline and Discharge Laboratory Values of Test and Control Groups

Laboratory Test	Test (n=800) (Mean ± SD)		P value
	Baseline	Discharge	
Serum Creatinine (mg/dL)	8.83 ± 2.54	3.56 ± 1.55	0.000*
Urea (mg/dL)	114.60 ± 41.20	71.21 ± 21.79	0.000*
Sodium (mEq/L)	137.48 ± 12.99	136.70 ± 7.79	0.795
Potassium (mEq/L)	5.95 ± 0.83	5.06 ± 0.67	0.000*
Chloride (mEq/L)	102.56 ± 7.69	101.12 ± 7.37	0.566
Phosphate (mg/dL)	7.01 ± 0.95	5.78 ± 0.74	0.000*
Haemoglobin (mg/dL)	10.55 ± 2.38	11.28 ± 2.40	0.002*
Random blood sugar (mg/dL)	176.88 ± 82.20	130.48 ± 29.70	0.001*
Total WBC Count (Cells/mm^3)	9415.74 ± 4738.78	8900.74 ± 3590.86	0.525
Platelet (X 10^9 per litre)	223.49 ± 71.79	234.43 ± 94.48	0.496

When two or more medications have comparable qualities, the decision should be based on a comparative analysis of the medications' relative quality, safety, efficacy, cost, and accessibility in the area.

Table 1 b: Comparison of Mean Baseline and Discharge Laboratory Values of Test and Control Groups

Control (n=810) (Mean ± SD)		P value
Baseline	Discharge	
7.72 ± 2.33	4.03 ± 2.39	0.000*
102.47 ± 37.37	61.93 ± 14.75	0.000*
129.33±17.69	133.85 ± 9.02	0.255
5.43 ± 1.34	4.72 ± 0.97	0.049**
109.63 ± 5.89	105.52 ± 6.23	0.016*
6.40 ± 1.23	5.94 ± 0.95	0.001*
9.81 ±2.33	10.22 ± 1.82	0.003*
185.77 ± 76.93	155.87 ± 56.29	0.009*
7871.11± 2084.98	7808.89 ± 2207.79	0.698
235.39 ± 68.98	272.11 ± 111.64	0.115

The cost of the entire course of therapy should be taken into account when comparing the prices of different medications, not just the cost per unit. Because amoxicillin is administered three times daily rather than the four times required for ampicillin, the cost of an ampicillin capsule may be lower than that of an amoxicillin capsule, but the overall cost of treatment may be lower for amoxicillin.

Table 1 c: Comparison of Mean Baseline and Discharge Laboratory Values of Test and Control Groups

Total (n=1610)	

(Mean ± SD)		P value
Baseline	Discharge	
8.26 ± 2.47	3.93 ± 2.14	0.000*
108.43 ± 39.59	64.59 ± 19.44	0.000*
130.37 ± 16.35	137.48 ± 6.16	0.006*
5.95 ± 1.12	4.91 ± 0.80	0.000*
106.23 ± 7.63	100.46 ± 7.58	0.000*
6.70 ± 1.13	5.86 ± 0.85	0.000*
10.19± 2.37	10.77 ± 2.20	0.000*
181.11±79.22	142.57 ± 45.83	0.000*
8653.30 ± 3743.75	8374.72 ± 3028.54	0.502
229.36±70.19	253.01 ± 104.32	0.090

The majority of vital medications ought to be made as individual chemicals. Only when the dosage of each ingredient satisfies the needs of a specific population group and when the combination has a demonstrated therapeutic benefit over individual drugs given separately are fixed-ratio combination products permitted. Dosing flexibility is provided by single compounds in a variety of circumstances.

Table 2: Drug Related Problems and Interventions Targeted at Disease Control

DRP	Intervention	Number of interventions (%)		
		Test (n= 215)	Control (n=100)	Total (n=315)
Untreated Indication - hypokalemia	Drug started	31(14.42)	14(14.0)	45(14,29)
Continued use of drug - Hyperkalemia	Drug stopped	40(18.60)	20(20.0)	60(19.05)
Drug interaction affecting potassium levels	Drug changed or Drug stopped	10 (4.65)	11(11.0)	21 (6.67)
Untreated Indication - Hyponatremia	Drug started	15 (6.98)	7 (7.0)	22 (6.98)
Hypocalcemia	Drug started	36(16.74)	14(14.0)	50(15.87)
Hyperphosphatemia	Drug started	27(12.56)	23(23.0)	50(15.87)
Anemia	Drug started	56(26.05)	11(11.0)	67(21.27)

A referral hospital, district hospital, health center, and dispensary all have varied drug requirements. The size and degree of the medical facility should undoubtedly determine how many medications are used.

4. CONCLUSION

Given the fast shifting global economic landscape and the scarcity of resources, the Essential Medicine Concept is more important than ever. Most medical demands can be met by a small number of carefully chosen medications. The Essential Medicine Concept provides the most economical answer to healthcare issues and is applicable everywhere. Enhancing undergraduate, graduate, and continuing medical education in clinical pharmacology, therapeutics, and medication information issues is a crucial responsibility of the government, academic institutions, and professional bodies. Despite the fact that many people worldwide still do not have effective access to necessary medications, WHO and its partners have made significant progress in closing this gap. The original realization that the majority of the world's needs might be satisfied by a small number of well selected medications is still true today, just as it was in 1977. The fundamental human right to obtain these medications is still problematic, though, and will necessitate more national and international action.

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