QuintilesIMS
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November 2016

Ensuring Essential Medicines Satisfy Priority Healthcare Needs of Populations

Evolution, Current State and Future Needs

Introduction

The introduction of the first Essential Medicines List (EML) by the World Health Organization (WHO) in 1977 was a landmark step towards the Millennium Development Goal of healthcare for all. The key driving force behind the concept was an understanding of the need to ensure availability of key medicines to satisfy the priority healthcare needs of the population. The EML has proven to be a powerful tool for promoting health equity across the globe, and its impact has been significant, as essential medicines (EM) are considered to be one of the most cost-effective elements in healthcare.

While the concept of the EML is admired, the extent of actual application and impact is less clearly defined. Moreover, the adoption of Sustainable Development Goals and the 2015 revision of the WHO's Model EML signal a new era for this concept. The 2015 revision included several new drugs, including 16 new cancer medicines to treat almost 18 cancer types, and medicines for multi-drug resistant tuberculosis, hepatitis B and C. The requirements these medicines place on a health system for appropriate patient diagnosis, medicine handling and administration, clinical expertise and patient follow-up are in some cases significant. Health systems that adopt these essential medicines in their own lists will need significant modification and advances to ensure the drugs bring their full potential benefit to populations in the future.

This report takes a closer look at the current state and future direction of essential medicines including health system elements impacting use of the EMs, usage and available funding support, and potential approaches to ensure EMs achieve their full potential. Countries studied are Brazil, China, India, Indonesia, Kenya, Mexico and South Africa. Disease areas studied are autoimmune disorders, cardiovascular system, diabetes, HIV, malaria, mental health, oncology and tuberculosis.

The research for this report was undertaken by the QuintilesIMS Institute with funding provided by the International Federation of Pharmaceutical Manufacturers and Associations. All research, interpretation and the development of this report was carried out independently. The contributions of Dr. Rajalakshmi Nair, Ms. Sandhya Raman, and Ms. Durgesh Soni in preparing this report, as well as from colleagues across QuintilesIMS, are gratefully acknowledged.

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Executive summary

Essential Medicines have a critical role to play in global health systems and the model list developed by the WHO provides important guidance to low and middle income countries as they establish their own sets of key medicines to meet the healthcare priority needs of their population. Since the introduction of the first WHO Model EML in 1977, the number of molecules has doubled to more than 400. The 2015 revision to the list, in particular, added a large number of new treatments, including 16 new cancer medicines as well as drugs for treating tuberculosis and hepatitis.

As the EML expands and the composition of drugs changes, the general health system requirements to support the appropriate use of these medicines necessarily become more numerous and complex. Some of the common factors influencing access include healthcare infrastructure, rational selection and use of drugs, financial support, affordability, and the presence of reliable procurement and supply chain systems. In the countries studied, these requirements can be significant barriers to populations receiving the full benefits from essential medicines.

In addition, therapy-specific requirements also exist. In the case of the eight disease areas evaluated in this study, specific needs exist across a range of health system elements, including requirement for specialist healthcare professionals, imaging techniques and biopsy capabilities, patient monitoring and follow-up activities, palliative or supportive therapy, specialty hospitals or clinics, and specialized storage and handling of medicines. While the WHO, and in some cases UN, define the optimum requirements for the therapy areas, the ability of health systems to meet these requirements varies widely between countries. Considerable attention appears to have been given by countries towards the management of infectious diseases, especially TB and malaria, but similar focus appears to be lacking for non-communicable diseases (NCDs) despite their global burden and potential economic impact.

The combination of general health-system and therapy-specific requirements for effective use of essential medicines – and the challenges countries have in meeting them – highlights the multiple factors that go well beyond the ex-manufacturer price of the medicines.

The process for updating EMLs by the WHO and individual countries varies widely. The WHO selects medicines for inclusion based on disease prevalence and public health relevance, evidence of clinical efficacy and safety, and comparative costs and cost-effectiveness. There appears to be wide variance in both the amount and quality of cost-effectiveness data included in submissions. Of the 134 applications submitted to the WHO Expert Committee between 2002 and 2013, only 6% included complete price and economic evaluation data. And of 23 medicines evaluated in the 2015 cycle related to the therapy areas examined in this report, only 3 provided details on cost-effectiveness and the source for drug prices was not standardized across disease areas. With the expansion of the WHO EML to include more recently launched drugs, the approach taken to assessing medicines takes on greater importance. Methodologies, inputs, assumptions and analysis results will all require specialized attention in order for the WHO Model List to be of value to country nations.

When countries add medicines to their EMLs, there can be an expectation that the consumption volume will increase consistent with the understanding that EML drugs are intended to be available to satisfy the healthcare priorities of the population. However, this is not universally observed. EML drug uptake is higher in countries where governments have adequate funding, pricing strategies in place, policy attention and necessary healthcare infrastructure. Communicable diseases, which have been areas of major government initiatives in tacking tuberculosis, malaria and HIV, generally have higher use of essential medicines. In mental health, many countries see no increased rate of use of those molecules added to the EML, and the overall share of total volume held by essential medicines is generally lower than in other therapy areas.

Government healthcare sector funding is constrained in all countries, leaving relatively low levels of investment relative to GDP and high levels of patient costs. Achieving adequate financing for the procurement and distribution of essential medicines remains a key challenge in many low and middle income countries, and international funding is usually focused on infectious diseases while the funding focus for non-communicable diseases–a large and growing source of the burden of disease–is significantly lower.

Most of the countries evaluated have implemented robust EMLs, including several potential drugs for specialty diseases. However, many of these countries lack specific guidelines for supporting the rational use of medicines, resulting in EMLs which are exhaustive but which may not be logistically and realistically possible to support or implement. In addition, the availability and affordability of essential medicines is often low in the public sector and continues to be a matter of concern.

An effective healthcare delivery system is a fundamental requirement for the WHO's concept of essential medicines to be realized. It results from the complex interplay of several factors including human resources, health financing, and service delivery. Piecemeal approaches for improving healthcare system can only yield short-term improvements in the overall utilization of EMLs. Long-term commitment from governments in terms of improved healthcare infrastructure, both in terms of facilities as well as skilled manpower, improvement in supply-chain capabilities, financial support, as well as constructive and sustainable affordability initiatives are a few of the key factors that may help improve access to essential medicines and enable them to play their full role in health systems.

Health system requirements to support appropriate use of essential medicines

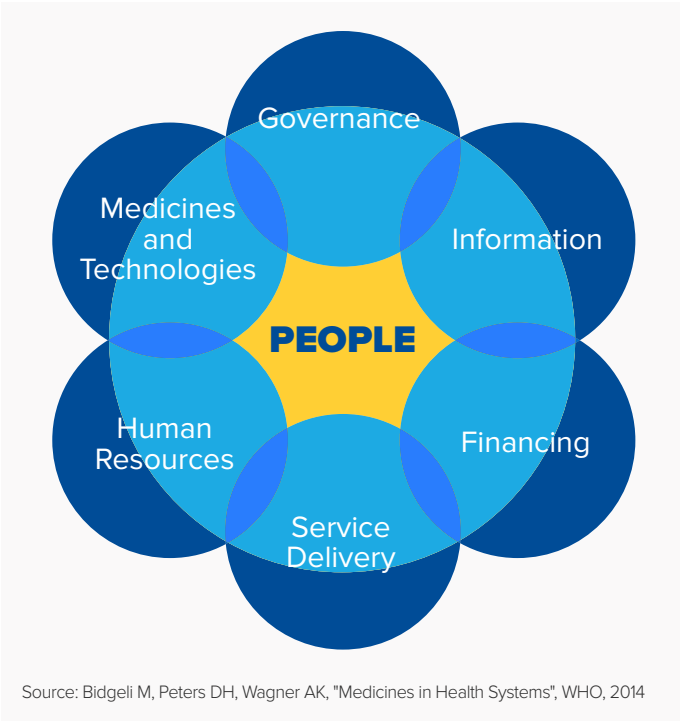
The WHO has defined six building blocks of health systems: leadership/governance, healthcare financing, health workforce, medical products and technologies, information and research, and service delivery (see Exhibit 1). These are considered necessary to provide improved health, responsiveness, financial risk protection, and improved efficiency of healthcare services.[1] All of the health system components are closely interconnected and must work in tandem to ensure the effectiveness of health systems in supporting the health of populations.[2]

General health system requirements

Ensuring accessibility and availability of essential medicines is complex and affected by a number of factors. Since the introduction of the first EML in 1977, the number of molecules has increased from about 200 to more than 400. The 2015 revision to the list, in particular, added a large number of new treatments, including 16 new cancer medicines as well as drugs for treating tuberculosis and hepatitis (see Exhibit 2).

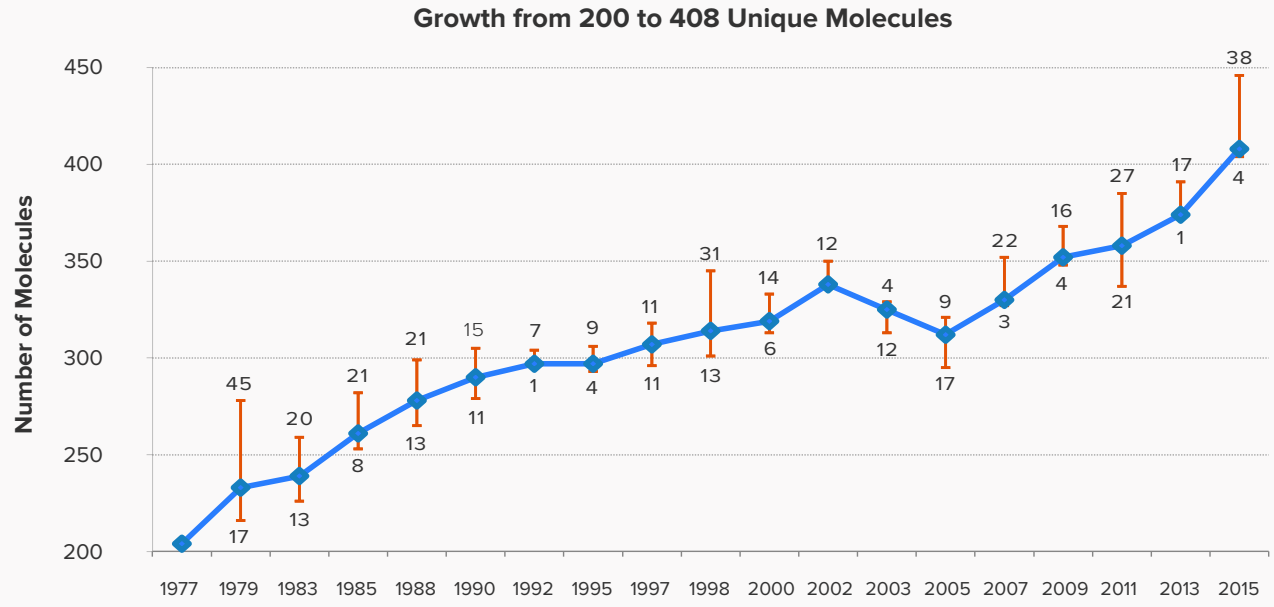
As the EML expands and the composition of drugs changes, the general health system requirements to support the appropriate use of these medicines necessarily become more numerous and complex. Some of the common factors influencing access include healthcare infrastructure, rational selection and use of drugs, financial support, affordability, and the presence of reliable procurement and supply chain systems.

Exhibit 1: Interconnectedness of Health System



Source: Bidgeli M, Peters DH, Wagner AK, "Medicines in Health Systems", WHO, 2014

Exhibit 2: Evolution of the WHO Model Essential Medicines List



Source: WHO Model EML
Notes : Error bars indicate number of additions and deletions every year (absolute)
* includes both core and complementary medicines

Healthcare infrastructure

Globally, there is a wide disparity among countries in the availability of healthcare workers. In the African Region, there are only 2 physicians per 10,000 population compared with 32 per 10,000 in the European Region. The WHO estimates that countries with fewer than 23 healthcare professionals (counting only physicians, nurses and midwives) per 10,000 population will be unlikely to achieve adequate coverage rates for the key primary healthcare interventions.[3] UN Sustainable Development Goals also recognize the importance of investment in infrastructure support for ensuring access to healthcare.

Availability of essential medicines at low-cost or free-of-charge, is very poor in most low- and middle-income countries (LMICs). Surveys in these countries indicate that only 35% of selected medicines were available in the public sector while 63% were available in the private sector at prices well above the international reference price.[3] Government funding to healthcare sector is usually very low[4] and may be wasted or misallocated due to politics and corruption.[5]

Selection and rational use of medicines and financial support

Evidence-based selection of medicines and their appropriate alignment with standard treatment guidelines or protocols can help improve adherence and promote rational use by the prescribers. Among the countries evaluated (see Methodology section for details), only South Africa was found to have Standard Treatment Guidelines (STGs) which incorporated the essential medicines list. All the other countries only provide a list without specific guidelines for optimal use.

Financial support, in the form of favorable reimbursement/insurance policies are also a key factor to ensure accessibility and affordability. Linking the national reimbursement policies to a country's EML may provide further support for implementation as seen by the higher uptake of essential medicines listed in China's EML which have higher reimbursement rates compared to non-essential medicines.

Affordability

Governments adopt various approaches for ensuring the affordability of essential medicines – including the use of tender invitation systems, price ceilings, International Reference Pricing, and market-based pricing. These mechanisms are typically aimed at the manufacturers of the drugs and seek to lower the ex-manufacturer price. However, the cost of the drug to the end payer or patient includes markup costs of supply and distribution intermediaries, so that even generics with the lowest ex-manufacturer cost may be higher than international reference pricing for the patient.

Moreover, due to limited availability of drugs in public sector outlets in most LMICs, patients often pay out-of-pocket to purchase medicines from the private sector, where prices are higher.[6] According to WHO surveys conducted from 2007 to 2012, lowest priced generics in the private sector averaged 5 times the international reference pricing.[7]

Approximately 95% of the medicines included in WHO EML are off-patent. Use of generic versions of drugs has often been proposed as a step towards improving affordability. While this may be a feasible solution, WHO has acknowledged the possibility of quality issues with use of generic drugs as these are often not subject to strict quality assurance processes.[8] Even when governments undertake initiatives for driving uptake of generic drugs, such as the Jan Aushadhi stores started by Government of India, patients' lack of confidence in the quality of generic medicines provided at public facilities can also be a barrier for success of these initiatives.[9]

Providing medicines at discounted prices is another approach used by countries aiming to improve affordability and reduce patient expenditure for their treatment. The Affordable Medicines and Reliable Implants for Treatment (AMRIT) program for cancer and heart diseases, initiated in November 2015 by the Government of India, is one such example. It provides 202 cancer and 186 cardiovascular drugs, and 148 types of cardiac implants at significant discount and covers both essential and non-essential medicines.[10]

However, while affordable pricing is one factor for improving access to medicines, by itself it cannot ensure a population has full and timely access to the essential medicines it needs. The role of other factors, including infrastructure, procurement and supply chain capabilities, are critical to the goals of EMLs, such that no one factor can be viewed in isolation as the determinant of a successful EML program.[11]

Procurement and supply chain

Efficient procurement and supply chain management are important elements impacting access to essential medicines. Gaps in demand forecasting, lack of systematic procurement, supply, and distribution systems often cause low levels of availability and ensuing potential drug shortages. These in turn often result in medicines being purchased through private channels which often result in higher out-of-pocket expenses for the patient.

The common reasons for gaps in the supply chain include lack of early warning systems for predicting potential shortages, limited number of suppliers to meet the tender quotes, and poor ordering practices at healthcare facilities. Several governments have initiated programs to tackle drug shortages for HIV medicines such as implementation of an early stock

out warning system, a Pipeline Analysis Tool (PAT) in South Africa[12] and regulatory changes in the procurement system in China allowing hospitals to choose suppliers.[13] However, in countries like India and Indonesia, procurement and supply of medicines is often decentralized and the procurement process and logistics capacity across the provinces are not uniform.

A functioning medicine supply chain, including all its elements such as effective procurement, appropriate warehousing, and efficient transportation, is critical to ensure access to essential medicines and preserve quality of medicine. However, ensuring effectiveness of the supply chain is challenging given the complexity and unpredictability of the healthcare industry. Improving demand forecasting may help improve co-ordination between manufacturers and governments to ensure timely supply and availability. Country-level initiatives and mechanisms are required to create procurement and distribution plans for the selection of reliable suppliers, uniform bidding process, inspection of facilities, logistics management, and training of supply chain staff on inventory management, forecasting, and procurement and requisitioning.

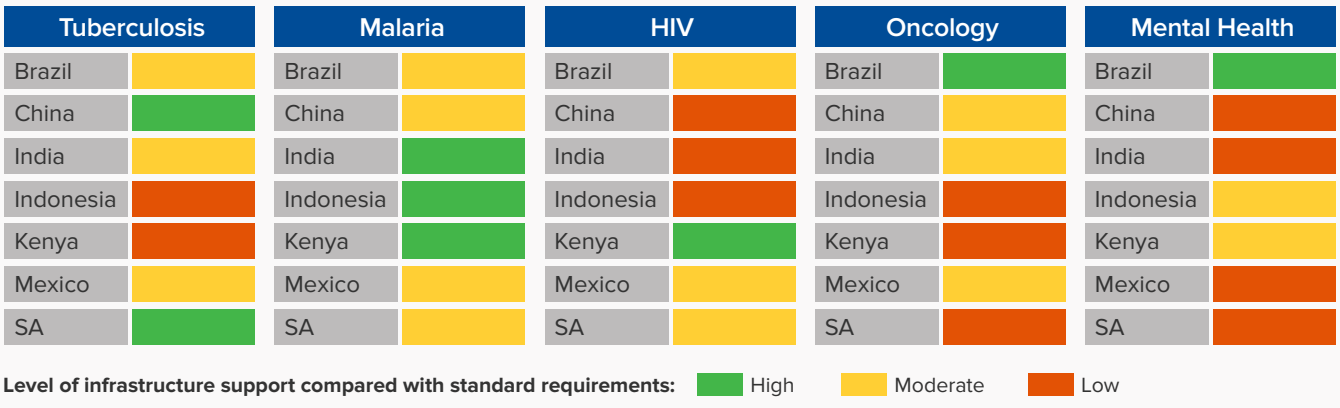
Therapy-specific health system requirements

While fulfilling general health system requirements is imperative for improving access to, and availability of, essential medicines and healthcare, therapy-specific requirements also exist. In the case of the eight disease areas evaluated in this study (see Methodology section for details), specific needs exist across a range of health system elements, including a requirement for specialist healthcare professionals, imaging techniques and biopsy capabilities, patient monitoring and follow-up activities, palliative or supportive therapy, specialty hospitals or clinics, and specialized storage and handling of medicines. While the WHO, and in some cases UN, define the optimum requirements for the therapy areas, the ability of health systems to meet these requirements varies widely between countries.

Exhibit 3 below provides a consolidated view of the level of specific therapy area support available relative to standard requirements for the effective use of essential medicines in the countries of interest.

While considerable attention appears to have been given by countries towards the management of infectious diseases, especially TB and malaria, similar focus appears to be lacking for NCDs despite their global burden and potential economic impact. Overall, infrastructure support for these therapy areas appears to be better in Latin American countries (Brazil, Mexico) compared with other countries evaluated.

Exhibit 3: Therapy Area Requirements and Infrastructure Availability in Countries[14]



Source: WHO country profiles
Notes: Cardiovascular Diseases, Diabetes, and Autoimmune Disorders excluded due to lack of WHO country profiles. For detailed methodology please see Appendix.

Infectious diseases

For the effective use of essential medicines in treating infection diseases, specific health system requirements include the following examples:

Tuberculosis

According to the Global Plan to Stop TB (2011-2015), countries should have at least one laboratory per 100,000 population for quality-assured AFB microscopy and at least one culture laboratory per 5 million population or equivalent capacity to diagnose smear-negative TB and perform drug resistance testing using conventional or molecular tests. However, some of the LMICs fall behind due to lack of infrastructure and skilled personnel (Exhibit 3).

Malaria

Diagnosis of HIV requires trained healthcare workers for infection control procedures and to limit the exposure to hazards.[15] Pharmacy infrastructure requirements include an additional secured area for antiretrovirals (ARVs) with specific requirements for the control of temperature, light, humidity and pests.[16] HIV rapid testing is now routinely used at integrated counselling and testing centers, and these facilities are integral components for providing holistic care for HIV patients in line with the 5Cs (consent, confidentiality, counseling, correct test results, connection/linkage to prevention, care, and treatment) defined by WHO for all HIV testing centers.

HIV

Despite global initiatives for tackling this disease, several factors including poor medicine supply and distribution systems, as well as insufficient health facilities and an overburdened healthcare force undermine the availability of ARV medicines in countries like India, China, South Africa, Mexico, Indonesia and Brazil.

Non-Communicable Diseases (NCDs)

Despite the wide availability of evidence for practical interventions, the burden of NCDs continues to increase in LMICs. Effective management of NCDs, mainly cardiovascular disease and diabetes, involves active prevention and treatment strategies including evidence-based national guidelines or protocols for management through a primary care approach. Most LMICs are currently not well equipped to respond to NCDs. As some of the diseases may share common risk factors, they may also share common health systems related constraints that limit access to needed essential medicines, thus providing opportunities for intervention and treatment synergies. However, achieving these synergies is dependent upon country-specific policies and limitations, including the following:

Cardiovascular System (CVS) Diseases

Effective primary prevention strategies such as implementing tobacco and alcohol control policies, steps to discourage intake of high fat and sugar foods, and facilities to improve physical activity are the first steps towards controlling CVS diseases. Primary prevention is a cost-effective and feasible approach for use in primary care in a low-resource setting. Secondary prevention, in terms of reducing associated morbidity and mortality, requires the availability of medicines such as beta blockers, statins, and aspirin.

In addition to drugs, CVS treatment may involve surgical procedures (including coronary artery bypass, angioplasty, heart transplantation, and value repair) and special medical devices (including pacemakers and prosthetic values) which demand improved infrastructure and skilled healthcare providers.

Currently, most LMICs suffer from major gaps in the implementation of secondary prevention interventions that can even be delivered in primary care settings. For example, the WHO-PREMISE study of 2005 evaluating extent of secondary prevention of coronary heart disease and cerebrovascular disease in 10 LMICs found that cost-effective interventions could not be implemented even when available due to various reasons including lack of health system capacity for managing chronic care and lack of national drug policies.[17] In 2013, WHO member states agreed to adopt the policies of the WHO Global NCD Action Plan to effectively tackle burden of CVS.[18]

Diabetes

Even as the prevalence of diabetes grows in developing countries, its effective management through early diagnosis and treatment can be accomplished by inexpensive blood testing and insulin or oral medications. A key component in diabetes management is Self-Monitoring Blood Glucose (SMBG). Supportive care for screening and treatment of retinopathy, lipid control and diabetes-related kidney disease also forms a part of effective diabetes management.[19]

While most countries evaluated do have an operational policy/strategy/action plan for diabetes and evidence-based national diabetes guidelines/protocols/standards, basic evaluation techniques such as oral glucose tolerances test and HbA1c tests are not available in the primary care facilities of a number of countries.[20] Availability, accessibility, and affordability of insulin has also been reported to be low compared to oral hypoglycemic medicines.[21]

Oncology

Cancer requires a multifaceted approach in management. In line with the complexity of the disease, requirements for managing it are equally complex throughout the continuum of care—from diagnosis to treatment and follow-up. While imaging tests help in initial diagnosis, tissue biopsies requiring skilled professionals and equipped facilities are required for staging and treatment decisions. Procedures for oncology also require trained technicians, equipped laboratories, cold storage for frozen biopsies and specialists to interpret results.[22] In addition, recent advances in science have brought about significant changes in cancer care with the introduction of precision medicines based on targeting specific genotypes.

A patient's optimal treatment is often multi-pronged and involves surgery, radiation therapy, anti-cancer therapies including chemotherapy and targeted therapies, as well as specialized supportive functions such as counsellors and psychologists to help a patient cope with the diagnosis and treatment.

Due to the complexities involved, these patients are usually treated at tertiary care hospitals, with little or no support available at the primary health care system level. However, even at the level of tertiary care hospitals, many countries are ill-equipped in terms of available infrastructure and skill-sets for cancer care. Major infrastructure barriers include a lack of trained health care professionals, a shortage of supplies, and a lack of adequate laboratories and equipment (see Exhibit 4).

Despite the burden of cancer in LMICs, very few of these countries employ comprehensive cancer prevention strategies, resulting in high numbers of patients presenting with advanced disease and a high economic burden, both on the healthcare system as well as the patients.[24]

Autoimmune Disorders

In the case of autoimmune disorders, Rheumatoid Arthritis (RA) is most commonly experienced by patients. In Brazil, arthritis patients are required to be consulted by a rheumatologist ideally within six weeks of symptomatic onset.[25] However, a shortage in the number and imbalanced distribution of rheumatologists has resulted in primary care physicians playing a greater role in diagnosis and treatment. For example, in Brazil, rheumatologists are concentrated more in state capitals and large municipalities compared to other regions.[26]

Exhibit 4: Infrastructure Requirements for Cancer Treatment[23]

Cancer Treatment	Route of Administration	Infrastructure Requirements	
		Storage	Administration
Chemotherapy	Mostly oral	Secure storage with restricted access	No need of specialty treatment center
Biologics	Intravenous infusions	Cold storage facilities	Specialty treatment center to manage any untoward adverse event during administration of intravenous

Source: Cancer.net

Although WHO recommends at least one rheumatologist per 100,000 people, the majority of LMICs fall short significantly, e.g. Kenya has two per 100,000 population.[27]

Although treatment of RA has improved with the availability of disease-modifying anti-rheumatoid drugs (DMARDs), late diagnosis due to lack of trained rheumatologists and delay in initiation of DMARDs results in progression, escalating costs and poor patient outcomes.

Mental Health

Despite mental health disorders contributing significantly to disability worldwide, only a minority of patients receive basic treatment, and this treatment gap appears to be largest in LMICs. According to the WHO mental health Global Action Programme (mhGAP) launched in 2008, about 75% of patients in many LMICs do not have access to required treatment.[28]

Major barriers for treatment gaps consist of infrastructure limitations in terms of the availability of skilled professionals, associated social stigma, and lack of awareness. In most LMICs, mental health is often underdiagnosed as most of the patients are attended by primary care staff or traditional healers due to lack of specialists. Due to the underestimated burden, metal health is often not prioritized as a healthcare concern and hence lacks sufficient government funding and policies.

The WHO has recommended integration of mental healthcare in primary care settings and the training of primary health care workers to aid early detection and management of mental disorders.[29]

Access to essential medicines for mental health may also be affected by prescriber requirements (preventing primary healthcare workers from prescribing) and requirements for storage in double-lock cupboards with restricted access. This complicates management, prescription and usage.

Due to the chronic nature of mental disorders, these patients often require long-term treatment, monitoring, and patient adherence. Infrastructure limitations again result in patients being lost to follow up, resulting in care that is inconsistent and often incomplete.

Approaches used by WHO and countries to assess the role and value of essential medicines

Process and steps in updating WHO EML

The WHO selects medicines for inclusion in the EML based on disease prevalence and public health relevance, evidence of clinical efficacy and safety, and comparative costs and cost-effectiveness.[30]

The process for inclusion, change or deletion of a medicine by WHO includes the following steps (see Exhibit 5):

- An application with answers to 15 questions related to disease burden, efficacy, safety, comparative cost-effectiveness, and product-specific considerations is submitted by or through relevant departments in the WHO to the secretary of the WHO Expert Committee[31]
- The Expert Committee for evaluation comprises 8-12 members, selected by the Director General from the WHO Expert Advisory Panels based upon equitable geographical representation, gender balance and professional competencies[32]
- The applications, received at least 4 months prior to the Expert Committee meeting, are reviewed and posted with comments on the website
- Posted comments are reviewed by the Secretary of the Expert Committee for completeness, and the final result, summarized in the Expert Committee report, is published as a WHO Technical Report Series

While comments on applications and draft recommendations are invited from patient advocacy groups, they are not included in the decision-making parts of meetings of the Expert Committee.

Exhibit 5: Current Process and Steps in Updating the WHO Model EML

Source: Ham van den, R. Selection of Essential Medicines – a background paper for the World Medicines Situation 2010 report. Utrecht University and WHO Collaborating Centre for Pharmacoepidemiology & Pharmaceutical Policy Analysis, 2009

Overview of Process for Country EMLs

The WHO Model EML serves as a guide for the development of national EMLs, and countries often customize the list based upon the healthcare needs of their people and the specific circumstances of their health system. The approach taken differs by country.

For example, while FORNAS (National Formulary) for Indonesia is developed through a national process which has a high level of similarity with the WHO EML process, South Africa places emphasis on standard treatment guidelines (STGs) as the basis for the process of selecting essential drugs. The process is participatory and evidence-based evaluation is applied during development as well as review of their EML.[33]

Brazil has national, state, and city level lists termed as RENAME, RESME and REMUME, respectively.[34] RENAME is formulated based upon National Medicine Policy (PNM) and the National Policy for Pharmaceutical care (PNAF) by the Ministry of Health. It meets the guidance laid down by WHO and has adopted drug classification into therapeutic categories based upon the WHO Model List. Until the 2010 EML revision, the list was prepared on the basis of a comparative evaluation of efficacy, effectiveness, safety, convenience, and cost of medicines for the country's priority health conditions with an expert committee (COMARE) conducting the evaluation.[35] Federal and state lists were developed by members with expertise and explicit criteria and appointed by the national list committee.[36] However, a recent Ministry of Health Ruling 533, redefined RENAME as a single list comprising 810 medicines. While this list is more comprehensive and created with the intent of fulfilling the goal of universal healthcare, it is no longer considered fully evidence-based and brings with it the logistical challenge of an already overburdened system managing such an extensive list.[35]

Similarly in Mexico, due to the implementation of the public insurance scheme, Seguro Popular, the EML is no longer evidence-based and is one of the longest among the countries analyzed. Two healthcare service providers in the Mexican healthcare system are IMSS and IMSSTE, each having an institutionalized list and National EML, but wide variance has been reported between the two lists, indicating a lack of uniform criteria for selection.[37]

Conversely, the selection process for China's National EML (NEML) differs significantly from that used by the WHO for its Model EML. While the WHO employs an evidence based approach for drug selection, China follows expert-based methods. The Ministry of Health (MOH), responsible for NEML, forms a committee of experts divided into two mutually exclusive groups, a consult group and a review group.[38] The consult group evaluates and proposes medicines to form essential candidate lists, while the review group votes on the candidate and determines the draft list. The government department then gives their comments on the draft list before handing it over to the managing authority for final approval. The Chinese selection system also accepts suggestions from the public and stakeholders for changes to the list.

India's National List of Essential Medicine (NLEM) is based upon two national reference documents: Indian Pharmacopeia and National Formulary of India.[39] NLEM is reviewed in consultation with experts of different subject domain and representatives of different national health programs followed by therapeutic area-wise group discussion. The updated list is then presented for an open-house discussion, and the draft is forwarded to NLEM for consideration by the NLEM core committee after modifications.[40] India appears to place limited value on evidence-based selection criteria defined by WHO to develop the list of essential medicines,[41] as evidenced by inclusion of obsolete medicines such as tincture benzoin in the 2011 NELM. Similarly, pantoprazole and famotidine were added to the list even when other cost-effective drugs from the same class (omeprazole and ranitidine) were already present.

Evaluation of Cost-Effectiveness for Inclusion in WHO Model EML

The analysis of cost-effectiveness is performed for the WHO Model EML within each of 30 therapeutic groups of medicines.[42,43] While the WHO considers comparative cost and cost-effectiveness as a parameter when evaluating medicines for inclusion in the EML, in 2001, the WHO Executive Board noted that "absolute treatment cost should not be a reason to reject a proposed addition to the model list if criteria for benefit and public health relevance are met." [44] Hence cost is no longer an acceptable reason for excluding an expensive but effective medicine from the list.

There appears to be wide variance in both the amount and quality of cost-effectiveness data included for consideration for additions to WHO EML. According to a study by Corrina Moucheraud, et al., out of 134 applications received by WHO Expert Committee on the Selection and Use of Essential Medicine between 2002 and 2013, only 6% included complete price and economic evaluation data.[45]

Of the 36 drugs included in the 2015 EML revision, 23 were for the 8 therapy areas being evaluated in this research. Analysis of each of the applications for new drugs in therapy areas of interest reveal a lack of uniformity in the sources for drug prices and limited data on cost-effectiveness (see Exhibit 6). Of the 23 applications reviewed, only three provide details on cost-effectiveness and the sources for drug pricing is not standardized across disease areas. Cancer drug applications include only efficacy and safety related data but not cost-effectiveness. Drug prices of all new cancer drugs are listed in a separate document by the Union for International Cancer Control (UICC) but not included as a part of the application.

Exhibit 6: Analysis of new drug applications for inclusion in EML, 2015[46]

Disease	New Drugs Added in 2015	Source for Drug Price	Cost-Effectiveness	Applicants
TB	Bedaquiline	Multiple sources	Cost-effectiveness calculated by per DALY gained	• Unit Laboratories, Diagnostics and Drug-resistance of the Global TB Programme of WHO Headquarters (WHO/HTM/GTB/LDR) • Janssen Pharmaceuticals
	Delamanid	MediPreis (Germany), British National Formulary	NA	Laboratories, Diagnostics and Drug-resistance of the Global TB Programme of WHO Headquarters (WHO/HTM/GTB/LDR)
	Linezolid	Global Drug Facility, Lexicomp	NA	Dr Alberto Matteelli, TB/HIV and Community Engagement Unit, Global Tuberculosis Program, World Health Organization, Geneva
	Terizidone	Global Drug Facility, MSH International Drug Price Indicator Guide, Médecins sans Frontières	NA	Unit of Laboratories, Diagnostics and Drug-resistance of the Global TB Programme of WHO Headquarters (WHO/HTM/GTB/LDR)
	Rifapentine	NA	Cost-effectiveness calculated per quality-adjusted life year (QALY) gained	Dr Alberto Matteelli, TB/HIV and Community Engagement Unit, Global Tuberculosis Program, World Health Organization, Geneva
HIV	Darunavir	NA	NA	Dr M. Vitoria, HIV/AIDS Department of the World Health Organization, Geneva
Cancer	Imatinib Trastuzumab Rituximab Bendamustine Capecitabine Cisplatin Oxaliplatin Bicalutamide All-trans retinoid acid (ATRA) Fludarabine Anastrozole Filgrastim Gemcitabine Vinorelbine Irinotecan Leoprorelin	Multiple sources		Union for International Cancer Control
CVS	Clopidogrel	International Drug Price Indicator list	Cost-effectiveness calculated by per life year gained	• Amisha Patel, MD, Northwestern Feinberg School of Medicine, Chicago, USA • Mahesh Vidula, BS, Northwestern Feinberg School of Medicine, Chicago, USA • Sandeep Kishore, MD, PhD, Yale University School of Medicine, New Haven, CT, USA • Rajesh Vedanthan, MD, MPH, Icahn School of Medicine at Mount Sinai, New York, USA • Mark D. Huffman, MD, MPH, Northwestern Feinberg School of Medicine, Chicago, USA

Source: WHO

Of the three applications which included detailed data for cost-effectiveness analysis, there was no uniformity in the nature of data included (see Exhibit 7).

Exhibit 7: Available Data on Cost and Cost-effectiveness in Applications of New Drugs Added to WHO's EML 2015[47-49]

Disease	Drugs	Cost	Cost-Effectiveness Analysis	Results
TB	Bedaquiline	BDQ is available through the GDF with a tiered pricing structure, including US $900 per 6 month patient course in LMICs and US $3,000 per 6 month patient course for MICs	A study is conducted to compare:Cost of MDR-TB treatment without bedaquiline in USD vs. incremental cost of adding bedaquiline to MDR-TB regimen vs. incremental cost per DALY gained	**Germany** 1. The incremental cost of adding bedaquiline to MDR-TB regimen: €3,518 (based on a price of €33,000 per treatment course of bedaquiline) 2. Incremental cost-effectiveness ratio was €3,369 per QALY gained 3. Probabilistic sensitivity analysis indicated the probability of bedaquiline being cost-effective was between is 82%-95% **UK** 1. The incremental cost per patient of adding bedaquiline to MDR-TB treatment regimens is estimated at -£11,434 (based on an assumed price of -£18,800 per treatment course of bedaquiline). 2. As bedaquiline leads to faster (and higher rates of) culture conversion, and UK patients are typically hospitalized until culture conversion, substantial savings can be realized from consequent reductions in duration of hospitalizations. 3. Adding bedaquiline to the treatment of MDR-TB: £10,008.75 per QALY gained or -£2,504.95 per DALY averted. 4. Probabilistic sensitivity analyses indicated
TB	Rifapentine	1. One preventive therapy course of RPT will cost to the individual US $273 2. Under the SANOFI Access to Medicines program, rifapentine would be provided to public sector and NGOs outside the US at a price of $32/box of 32 tablets 3. Estimated cost of one preventive therapy course (adult dose, reduced price) would therefore be US $72 at maximum.	1. Simulation computational model was designed using as comparator the 9H regimen to assess the cost-effectiveness profile of the RPT/INH preventive therapy regimen 2. Costs and health outcomes were estimated to determine the incremental costs per active TB case prevented and per quality-adjusted life year (QALY) gained by 3RPT/INH compared to 9H	1. Over a 20-year period, treatment of LTBI with 3RPT/INH rather than 9INH resulted in fewer cases of TB and 25 fewer lost QALYs per 1000 individuals treated 2. 3RPT/INH is cost-saving compared to 9H at the lower RPT price [using the 2014 reduced RPT price: $6.00 per 900 mg dose rather than $12.31] 3. This model includes directly observed administration of 3RPT/INH
CVS	Clopidrogel	Clopidogrel 75 mg has a median international cost of $0.0526/ tablet, ranging from $0.0238 to $1.1078 (International Drug Price Indicator published by Management Sciences for Health in 2013)	Acute Coronary syndrome 1. European models based on the CLARITY and Clopidogrel and Metoprolol in Myocardial Infarction (COMMIT) trials used for cost-effectiveness analysis 2. CURE trial for cost-effectiveness analysis for the treatment of aspirin and clopidogrel	1. In Sweden and France 1 year of clopidogrel resulted in cost savings of €111 and €367, respectively. In a similar group of patients in Germany, the incremental cost-effectiveness ratio (ICER) for clopidogrel was €92 per life year gained (LYG) 2. Treatment with aspirin and clopidogrel compared with aspirin alone was cost-effective with an ICER of €3,113 per LYG in a German model and an ICER of <$4,000/LYG in a Canadian model 3. CREDO trial: A cost-effectiveness analysis in this setting yielded ICERs ranging from $3,685/LYG to $4,353/LYG based on a model using data from the Framingham Heart Study. The ICERs based on Saskatchewan data were $2,929/LYG to $3,460/ LYG

Source: WHO; Int J Tuberc Lung Dis. 2014; Clinical Therapeutics, 2007

As EMLs expand, cost-effectiveness is to be expected to become a key factor in inclusion on country lists. However, analysis of cost-effectiveness for the WHO EML may not be relevant to country-specific EMLs as it would not be reflective of the realities of the country's healthcare system, requirements or costs. Most of the cost-effectiveness information for WHO assessments is derived from studies conducted in developed countries and may not be applicable to LMICs since the interpretation of effectiveness would depend on country-specific factors such as health system costs, disease prevalence, etc. With the expansion of the WHO EML to include more recently launched drugs that may also have patent protection, the approach taken to assessing medicines takes on greater importance. Methodologies, inputs, assumptions and analysis results will all require specialized attention in order for the WHO Model List to be of value to countries.

Volume of essential medicines consumption and impact on volume upon inclusion in country EMLs

When countries add medicines to their EMLs, there can be an expectation that the consumption volume will increase, consistent with the understanding that EML drugs are intended to be available to satisfy the healthcare priorities of the population. Analysis of the volume of medicines consumed before and after inclusion on a country's EML can provide insight into the impact of EML inclusion.

Key findings from analysis undertaken using QuintilesIMS proprietary volume sales data (see Methodology section for details) include the following:

- EML uptake is observed to be higher more often in countries where governments have adequate funding, pricing strategies in place, policy attention and health care infrastructure
- Communicable diseases including tuberculosis, malaria and HIV are areas of major focus of government initiatives and generally have higher uptake of essential medicines
    - While most governments provide additional programs to combat these diseases, lack of awareness and accessibility continues to be a barrier
- Despite implementation of universal public health coverage by several countries, infrastructure barriers continue to impede access to EML. For example, in Mexico,
    - Low consumption growth of CVS drugs may be the result of poor access to primary and acute care for these patients
    - Limited availability of specialized physicians and centers has been reported for treatment of oncology and mental health
- A focus on mental health is significantly lacking, both in terms of the availability of medicines included in EMLs as well as the infrastructure support required to ensure access
- The volume share of essential medicines relative to the total volume of medicines in a particular therapy area varies widely between countries (see Exhibit 8)
    - Among the NCDs, EML share for oncology medicines is high in Mexico and moderate in India and Indonesia
    - In most of the country EMLs researched, very low volumes of medicines for autoimmune disorders are being used
    - Among the communicable diseases, most countries have very high EML share for HIV medicines and the variation between countries is comparatively low

Exhibit 8: Essential Medicines Percent Share of Total Medicines Volume

Source: QuintilesIMS, MIDAS; Country EMLs
Notes: The analysis considered data for 7 years (3 years before and after the year of additions to EML). The years considered differ between countries depending on the timing of EML revisions. EML share of total volume in the third year after the revision has been considered for analysis here. TB denotes Tuberculosis. AI denotes Autoimmune. CVS denotes Cardiovascular disease. Chart excludes data for HIV in China, TB in Brazil and Oncology in South Africa where information was not available.

Funding approaches and levels for essential medicines

Inadequate financing for the procurement and distribution of essential medicines is a key barrier to accessibility in many LMICs. Although diverse sets of financing mechanisms are being adopted, there is scope for improving public funding in most LMICs. The most common sources of funding in LMICs include government/public sources, private and external/international donors (see Exhibit 9).

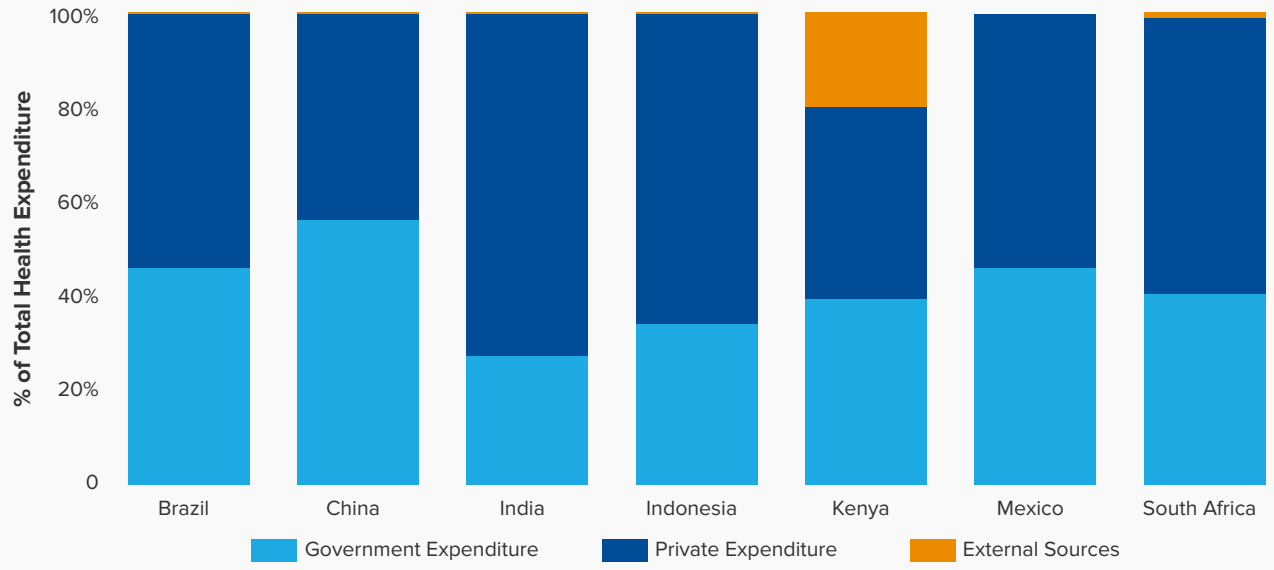
Exhibit 9: Common Sources of Health Care Funding

Government	Public	Private	External/International
Majority from Ministry of Health and minor contribution from other ministries	• Developmental banks • Grants and loans received from both internal and external agencies • General tax and non-tax revenues • Compulsory health insurance contributions either by employers or insured persons	• Private philanthropies include foundations, corporations, faith-based organizations, non-government organizations (NGOs) and individuals • Private insurance • Out-of-pocket	**Multilateral** • PEPFAR • GAVI • Global fund for TB, malaria, HIV **Bilateral** • Governments of US/UK etc.

Source: WHO

According to the global health expenditure data from WHO, government/public spending for healthcare is observed to be comparatively higher in Brazil, Mexico, and China, reflecting a focus on universal health coverage (see Exhibit 10). In Mexico, public expenditure on medicines is increasing owing to implementation of the Seguro Popular universal insurance program.[50]

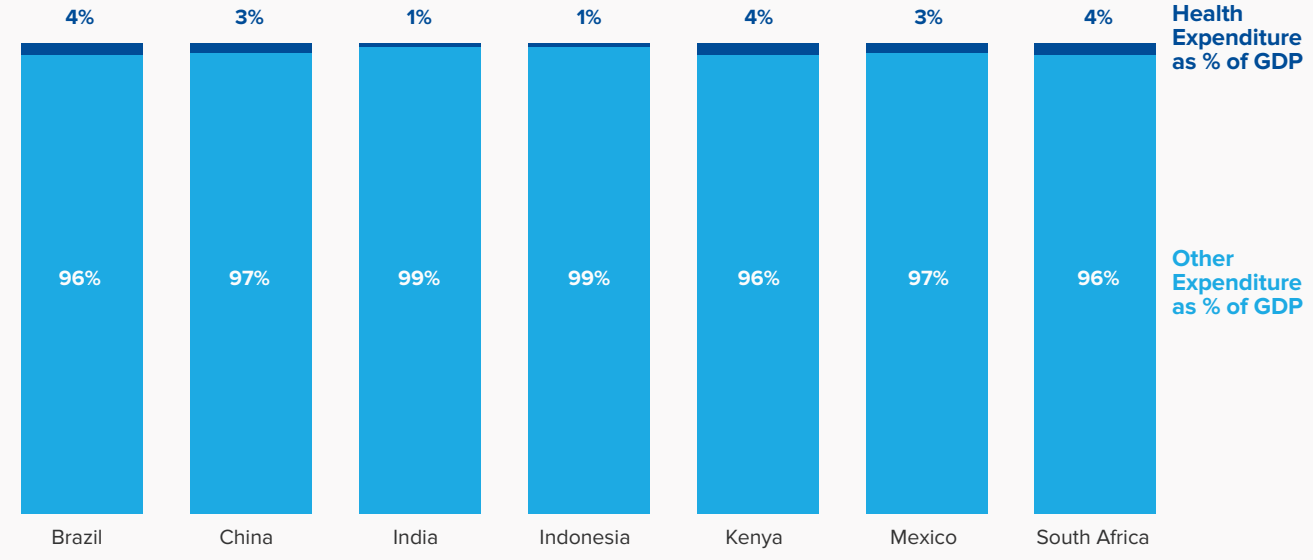
Exhibit 10: Health Expenditure in 2014



Source: WHO - Global Health Expenditure

Total government health expenditure as a share of GDP is in the range of 1% to 4% (see Exhibit 11). This compares to high income countries which spend on average 6%-9% of GDP on health, and reflects the great variations in health expenditure that exist across the globe.

Exhibit 11: Government Health Expenditure as a Share of GDP



Source: WHO - Global Health Expenditure

While a major proportion of the healthcare expenditure in developed countries may be dedicated to maintaining health systems that have already been established, improving health systems in LMICs requires higher investment for both setting up basic health services and maintaining their progress.[51]

In most of the low income countries (LICs), government health expenditure is too low to afford even a basic health package for the population due to a lack of available resources. For example, while the 2001 Abuja declaration under which African nations committed to allocating at least 15% of their annual budget to improve the healthcare sector, review of the status of these countries a decade later revealed that most countries were achieving less than 50% of the increase required to reach their goals by 2015.[52]

Despite government contributions to healthcare expenditure, private expenditure continues to form a substantial part of the funding levels in many of the countries analyzed, and is often due to bureaucratic delays and longer waiting times associated with the public health system.

International funding is typically focused on infectious diseases including AIDS, TB, and malaria. In the case of Kenya, the contribution from international funding is substantial with 28% of health care expenditure in 2014 being funded by external sources (see Exhibit 10). However, the level of international financing has remained flat in recent years.[51]

Compared with communicable disease, the funding focus for non-communicable diseases is significantly lower. A study by Sridhar and Batniji, published in Lancet 2008, estimated that funding per death from the world's four largest donors in 2005 (World Bank, Bill & Melinda Gates Foundation, the US Government, and the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria) was approximately $3.21 for NCDs compared with US $1,029.10 for HIV/AIDS. The study also highlighted the discrepancy between the diseases responsible for the greatest burden in LMICs and those that were the focus of disease-specific funding.[53]

Even when drugs for NCDs like cancer are donated, this does not necessarily ensure that patients will receive the benefit from those medicines due to barriers including drug restriction issues, customs requirements, and the infrastructure required to appropriately treat patients with these medicines.

Methodology and sources

Selection of countries and therapy areas

The countries studied in this research were Brazil, China, India, Indonesia, Kenya, Mexico and South Africa. These are intended to provide geographical balance and represent low and middle income countries. Countries were also selected based on the availability of robust data to undertake the quantitative analysis of the use of medicines included on Essential Medicine Lists.

The disease areas studied in this research were autoimmune disorders, cardiovascular system, diabetes, HIV, malaria, mental health, oncology and tuberculosis. These were selected to provide a balance of communicable and non-communicable diseases, and to include therapy areas that are relatively well represented on the WHO Model EML as well as some areas—notably autoimmune disorders and oncology—where newer treatments have been added recently or remain excluded.

Measurement of essential medicine use

For each country and each therapy area, the sales volume of medicines included in that country's EML was analyzed to assess their level of use relative to the total volume of all medicines in that therapy area. In addition, the impact of adding a molecule to an EML on the use of that medicine was measured for each molecule added over the past eight years. The change in volume was calculated for the three years prior to and the three years following the addition of the medicine to the list. The change in volume for those molecules was compared to the change in volume over the same period for other molecules in that therapy class not included in the EML.

The data source for this analysis was the QuintilesIMS MIDAS™ sales audit for the respective countries. MIDAS™ is a unique data platform for assessing worldwide healthcare markets. It integrates QuintilesIMS national audits into a globally consistent view of the pharmaceutical market, tracking virtually every product in hundreds of therapeutic classes and providing estimated product volumes, trends and market share through retail and non-retail channels. MIDAS data is updated monthly and retains 12 years of history.

Methodology for scoring matrix for therapy area requirements

The basic requirements for each therapy area across countries was populated using WHO country profiles. A scoring matrix was developed to compare the availability of these requirements. WHO or UN guidelines and recommendations were considered in setting benchmarks for scoring. For therapy areas with no benchmark from WHO/UN, a subjective cut-off was used (see Supporting Tables 1 and 2).
Every requirement of a therapy area was given a score of:

- 1 if it was below the WHO/UN recommendations or there was an absence of basic requirements;
- 2 if it was at or above the WHO/UN recommendations.

The sum of individual scores of every requirement in each country equals the final score of a therapy area in each country (see Supporting Table 3).

Supporting Table 1

Therapy Areas	Basic requirements according to WHO/UN	Brazil	China	India	Indonesia	Kenya	Mexico	S Africa
TB	Laboratories providing TB diagnostic services using sputum smear microscopy (per 100,000 population)	1.6	0.2	1	2.2	4.3	1	0.4
	Percentage of laboratories using LED microscopes	<1	38	2	0	21	NA	100
	Laboratories providing TB diagnostic services using culture (per 5 million population)	7.9	6.7	0.3	0.4	0.3	2.6	1.1
	Laboratories providing drug susceptibility testing (per 5 million population)	0.6	1.5	0.2	0.3	0.3	0.6	1.1
	Sites performing Xpert MTB/RIF	48	654	121	41	70	39	207
	Second-line drug susceptibility testing	Yes	Yes	Yes	Yes	No	Yes	Yes
Malaria	Availability of IITNS/LLINS, free of charge in public sector	Yes	Yes	Yes	Yes	Yes	Yes	No
	Rapid diagnostic testing (RDT/ microscopy), free of charge in public sector	Yes	No	Yes	Yes	Yes	Yes	Yes
	ACT, free in public sector	Yes	Yes	Yes	Yes	Yes	No	Yes
	Adverse event monitoring systems	No	Yes	Yes	Yes	Yes	Yes	Yes
HIV	Health facilities offering ART-2014	734	NR	409	446	1829	378	NR
	Testing/counseling facilities per 100,000 adult population- 2014	11	2	2	1	35	NR	11
	Percentage of pregnant women with HIV receiving ARV for preventing mother to child transmission- 2014	NR	NR	NR	10%	67%	82%	>95%
	ARV coverage for HIV positive patients- 2014	38-63%	NR	NR	8%	55%	50%	45%
Oncology	Cervical cytology (PAP)	>50%	>50%	>50%	<50%	<50%	>50%	NR
	Acetic acid visualization (VIA)	<50%	>50%	>50%	<50%	<50%	NR	NR
	Breast palpation / clinical breast exam (CBE)	>50%	>50%	>50%	<50%	>50%	>50%	NR
	Mammogram	>50%	>50%	>50%	<50%	<50%	>50%	NR
	Faecal occult blood test or faecal immunological test	>50%	>50%	<50%	<50%	<50%	NR	NR
	Bowel cancer screening by exam or colonoscopy	>50%	>50%	<50%	<50%	<50%	NR	NR
	Radiotherapy	>50%	<50%	>50%	<50%	<50%	>50%	NR
	Chemotherapy (medicines not specified)	>50%	<50%	>50%	<50%	<50%	>50%	NR
	Oral morphine (formulation not specified)	>50%	>50%	<50%	<50%	<50%	>50%	NR
	Community/home care for people with advanced stage cancer and other NCDs	>50%	<50%	<50%	<50%	<50%	>50%	NR
Mental Health	Psychiatrists (rate per 100,000 population)	3.49	1.7	0.3	0.29	NR	0.67	0.4
	Mental health workers (per 100,000 population)	30.8	NR	0.6	3.1	NR	9.5	NR
	Mental health outpatient facilities	1,839	NR	NR	317	100	58	NR
	Mental hospital beds (per 100,000 population)	11.6	16.8	2.1	4	1.6	3.2	22.7
	Psychiatric units in general hospitals (per 100,000 population)	0.4	NR	NR	NR	1.1	0.1	NR
	Residential care facilities (per 100,000 population)	1	NR	0	NR	NR	0	NR

Supporting Table 2

Therapy Areas	Basic Requirements	Score	Assumptions
HIV	Health facilities offering ART	1	Below 300 health facilities/ Not reported
		2	Above 300 health facilities
	Testing/counseling centre	1	Below 5 testing/counseling/ Not reported
		2	Above 5 testing/counseling
	Pregnant women receiving with ARV	1	Below 50% or Not reported
		2	Above 50%
	ARV coverage	1	Below 50% or Not reported
		2	Above 50%
Oncology	Testing units, mammogram, etc	1	Not available in 50% or more public care facilities
		2	Available in 50% or more public care facilities
Mental Health	Psychiatrists (rate per 100,000 population)	1	Below 1 per 100,000/ Not reported
		2	Above 1 per 100,000
	Mental health workers (per 100,000 population)	1	Below 1 per 100,000/ Not reported
		2	Above 1 per 100,000
	Mental health outpatient facilities	1	Below 100/Not reported
		2	Above 100
	Mental hospital beds (per 100,000 population)	1	Below 50 per 100,000
		2	Above 50 per 100,000
	Psychiatric units in general hospitals (per 100,000 population)	1	Below 1/Not reported
		2	Above 1
	Residential care facilities (per 100,000 population)	1	Below 1/Not reported
		2	Above 1

Supporting Table 3								
Therapy Areas	**Basic requirements according to WHO/UN**	**Brazil**	**China**	**India**	**Indonesia**	**Kenya**	**Mexico**	**S Africa**
TB	Laboratories providing TB diagnostic services using sputum smear microscopy (per 100,000 population)	2	1	2	2	2	2	1
	Percentage of laboratories using LED microscopes	2	2	1	1	1	2	2
	Laboratories providing TB diagnostic services using culture (per 5 million population)	1	2	1	1	1	1	2
	Laboratories providing drug susceptibility testing (per 5 million population)	1	2	2	1	2	1	2
	Sites performing Xpert MTB/RIF	2	2	2	2	1	2	2
	FINAL SCORE FOR TB	8	9	8	7	7	8	9
Malaria	Availability of IITNS/LLINS, free of charge in public sector	2	2	2	2	2	2	1
	Rapid diagnostic testing (RDT/microscopy), free of charge in public sector	2	1	2	2	2	2	2
	ACT, free in public sector	2	2	2	2	2	1	2
	Adverse event monitoring systems	1	2	2	2	2	2	2
	FINAL SCORE FOR MALARIA	7	7	8	8	8	7	7
HIV	Health facilities offering ART-2014	2	1	2	2	2	1	1
	Testing/counseling facilities per 100,000 adult population- 2014	2	1	1	1	2	1	2
	Percentage of pregnant women with HIV receiving ARV for preventing mother to child transmission- 2014	1	1	1	1	2	2	2
	ARV coverage for HIV positive patients- 2014	1	1	1	1	2	2	1
	FINAL SCORE FOR HIV	6	4	5	5	8	6	6
Oncology	Cervical cytology (PAP)	2	2	2	1	1	2	1
	Acetic acid visualization (VIA)	1	2	2	1	1	1	1
	Breast palpation / clinical breast exam (CBE)	2	2	2	1	2	2	1
	Mammogram	2	2	2	1	1	2	1
	Faecal occult blood test or faecal immunological test	2	2	1	1	1	1	1
	Bowel cancer screening by exam or colonoscopy	2	2	1	1	1	1	1
	Radiotherapy	2	1	2	1	1	2	1
	Chemotherapy (medicines not specified)	2	1	2	1	1	2	1
	Oral morphine (formulation not specified)	2	2	1	1	1	2	1
	Community/home care for people with advanced stage cancer and other NCDs	2	1	1	1	1	2	1
	FINAL SCORE FOR ONCOLOGY	19	17	16	10	11	17	10
Mental Health	Psychiatrists (rate per 100,000 population)	2	2	1	1	1	1	1
	Mental health workers (per 100,000 population)	2	1	1	2	1	2	1
	Mental health outpatient facilities	2	1	1	2	2	1	1
	Mental hospital beds (per 100,000 population)	1	1	1	1	1	1	1
	Psychiatric units in general hospitals (per 100,000 population)	1	1	1	1	2	1	1
	Residential care facilities (per 100,000 population)	2	1	1	1	1	1	1
	FINAL SCORE FOR MENTAL HEALTH	10	7	6	8	8	7	6

Appendix

The following summary tables show:

- For each therapy area, the change in volume during the three years prior to, and three years after, the addition of molecules to the country's EML. The change is volume is shown separately for those molecules included in the EML and those not included in the EML. The volume share of molecules included in the EML relative to the total therapy area is also calculated.
- For each country, the same information is shown for each therapy, using the same analysis as described.

Summary Table: HIV

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	6%	7%	90%	Both number and kind of drugs as well as price reductions and commitment to UHC are key to increased uptake
China	NA	NA	NA	EML of China does not mention drugs used in treatment of HIV
India	–4%	36%	48%	Poor coordination between NACO and state centers due to delay in approving tenders, supply bottle necks and late payment to drug makers
Indonesia	1%	NA	100%	EML includes majority of ARVs available
Mexico	2%	0	100%	EML 2011 includes all potential ARVs
South Africa	2%	0	100%	EML 2011 includes all potential ARVs

Summary Table: Malaria

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	17%	7%	79%	Includes overall consumption for clindamycin and doxycyclin (systemic anti-infectives) and not specifically for malaria
China	–16.6%	7%	99%	The decline in consumption can be attributed to a decrease in reported malaria cases
India	–5%	14.4%	82%	-
Indonesia	–6%	–12.6%	42%	Common anti-malarial chloroquine has been omitted from EML; malaria is probably not an area of concern since it has been showing a declining trend in the recent past
Mexico	–5%	NA	93%	All anti-malarial medicines available in Mexico are part of EML, 2011
South Africa	–3%	4%	18%	-

Summary Table: Tuberculosis

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	NA	NA	NA	No data available
China	10.6%	9.7%	87%	Strong government commitment to TB eradication
India	1.1%	0.9%	21%	Absence of drugs for second-line treatment of TB in EML list of India, 2011
Indonesia	–2.2%	–7.6%	37%	Despite initiatives towards UHC, infrastructure and socioeconomic issues continue to be key barrier to access in Indonesia
Mexico	-3%	0	100%	Effective tuberculosis management program is in place
South Africa	32%	27%	66%	-

Summary Table: Mental Health

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	14%	10%	43%	Lack of new generation drugs in EML and poor supply chain
China	10%	15%	54%	Significant number of patients receive free treatment under the '686 project' for mental health
India	0.3%	9%	31%	India lacks an officially approved mental health policy Poor infrastructure support - only 0.3 psychiatrists for every 100,000 people
Indonesia	2%	-2%	50%	-
Mexico	–5%	2%	54%	Despite 100% public health coverage, mental health is neglected Although the EML includes reasonably recent drugs like olanzapine and quetiapine, usage appears to be quite low
South Africa	5%	7%	47%	-

Summary Table: Oncology

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	25%	14%	26%	Lack of new targeted agents
China	6%	13.3%	14%	Lack of targeted therapies in EML. High treatment costs, insufficient insurance coverage, and lack of awareness
India	7%	–4%	61%	-
Indonesia	7%	24%	41%	Lack of targeted agents in 2011 EML
Mexico	–3%	7.5%	89%	EML 2011 medicines has a high share of both chemo and targeted agents
South Africa	NA	NA	NA	The standard guideline of SA does not include oncology drugs

Summary Table: Autoimmune Disorders

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	33%	13%	18%	Limited drugs in EML
China	9%	15.2%	66%	-
India	16%	5%	2%	Very few drugs included
Indonesia	13%	13%	0.1%	Very few agents included
Mexico	7%	1%	43%	-
South Africa	10%	8%	53%	-

Summary Table: CVS

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	28%	9%	73%	Exhaustive essential medicines list
China	8%	14%	40%	Limited CVS medicines listed
India	6%	12%	46%	Drug shortage due to scarcity of funds, poor procurement and distribution management
Indonesia	8%	9%	71%	-
Mexico	–3.2%	–0.1%	56%	Despite public health coverage and availability of drugs in EML, access to primary and acute care seem low as well as quality of acute CVD care have been reported to be low
South Africa	12%	7%	53%	-

Summary Table: Diabetes

Therapy Areas	Change in volume in 7 years		EML share of total volume in latest year	Comment
	EML	Non-EML		
Brazil	28%	12%	87%	Robust EML list, government initiatives to ensure universal health (SUS in Brazil) play a key role
China	16%	15%	70%	Mandating primary health care institutions to only stock and use medicines prescribed under EML may have contributed to significant positive impact on essential medicines
India	6%	-4%	45%	Effective price cap imposed by government
Indonesia	12%	14%	73%	-
Mexico	5%	3%	82%	Seguro health coverage program may be responsible for high consumption of EML medicines
South Africa	17%	22%	94%	Rise in diabetes incidence as well as awareness may be reasons for increased consumption

Summary Table: Brazil

Therapy Areas	Change in volume 2007–2013		EML share of total volume in latest year (2013)	Comment
	EML	Non-EML		
HIV	6%	7%	90%	Both number and kind of drugs as well as price reductions and commitment to UHC are key to increased uptake
Diabetes	28%	12%	87%	Robust EML list, government initiatives to ensure universal health (SUS in Brazil) play a key role
Malaria	17%	7%	79%	Includes overall consumption for clindamycin and doxycyclin (systemic anti-infectives) and not specifically for malaria
CVS	28%	9%	73%	Exhaustive essential medicines list
Mental Health	14%	10%	43%	Lack of new generation drugs in EML and poor supply chain
Oncology	25%	14%	26%	Lack of new targeted agents
AI	33%	13%	18%	Limited drugs in EML
TB	NA	NA	NA	No data available

Summary Table: China

Therapy Areas	Change in volume 2009–2015		EML share of total volume in latest year (2015)	Comment
	EML	Non-EML		
Malaria	–16.6%	7%	99%	The decline in consumption can be attributed to a decrease in reported malaria cases
TB	10.6%	9.7%	87%	Strong government commitment to TB eradication
Diabetes	16%	15%	70%	Mandating primary health care institutions to only stock and use medicines prescribed under EML may have contributed to significant positive impact on essential medicines
AI	9%	15.2%	66%	-
Mental Health	10%	15%	54%	Significant number of patients receive free treatment under the '686 project' for mental health
CVS	8%	14%	40%	Limited CVS medicines listed
Oncology	6%	13.3%	14%	Lack of targeted therapies in EML. High treatment costs, insufficient insurance coverage, and lack of awareness
HIV	NA	NA	NA	EML of China does not mention drugs used in treatment of HIV

Summary Table: India

Therapy Areas	Change in volume 2008–2014		EML share of total volume in latest year (2014)	Comment
	EML	Non-EML		
Malaria	–5%	14.4%	82%	-
Oncology	7%	-4%	61%	-
HIV	–4%	36%	48%	Poor coordination between NACO and state centers due to delay in approving tenders, supply bottle necks and late payment to drug makers
CVS	6%	-4%	45%	Effective price cap imposed by government
Diabetes	6%	12%	46%	Drug shortage due to scarcity of funds, poor procurement and distribution management
Mental Health	0.3%	9%	31%	India lacks an officially approved mental health policy Poor infrastructure support - only 0.3 psychiatrists for every 100,000 people
TB	1.1%	0.9%	21%	Absence of drugs for second-line treatment of TB in EML list of India, 2011
AI	16%	5%	2%	Very few drugs included

Summary Table: Indonesia

Therapy Areas	Increase in volume 2008—2014		EML share of total volume in latest year (2014)	Comment
	EML	Non-EML		
HIV	1%	NA	100%	EML includes majority of ARVs available
Diabetes	12%	14%	73%	-
CVS	8%	9%	71%	-
Mental Health	2%	-2%	50%	-
Malaria	–6%	–12.6%	42%	Common anti-malarial chloroquine has been omitted from EML; malaria is probably not an area of concern since it has been showing a declining trend in the recent past
Oncology	7%	24%	41%	Lack of targeted agents in 2011 EML
TB	–2.2%	–7.6%	37%	Despite initiatives towards UHC, infrastructure and socioeconomic issues continue to be key barrier to access in Indonesia
AI	13%	13%	0.1%	Very few agents included

Summary Table: Mexico

Therapy Areas	Change in volume 2008—2014		EML share of total volume in latest year (2014)	Comment
	EML	Non-EML		
HIV	2%	0	100%	EML 2011 includes all potential ARVs
TB	–3%	0	100%	Effective tuberculosis management program is in place
Malaria	–5%	NA	93%	All anti-malarial medicines available in Mexico are part of EML, 2011
Oncology	–3%	7.5%	89%	EML 2011 medicines has a high share of both chemo and targeted agents
Diabetes	5%	3%	82%	Seguro health coverage program may be responsible for high consumption of EML medicines
CVS	–3.2%	–0.1%	56%	Despite public health coverage and availability of drugs in EML, access to primary and acute care seem low as well as quality of acute CVD care have been reported to be low
Mental Health	-5%	2%	54%	Despite 100% public health coverage, mental health is neglected Although the EML includes reasonably recent drugs like olanzapine and quetiapine, usage appears to be quite low
AI	7%	1%	43%	-

Summary Table: South Africa

Therapy Areas	Change in volume 2009—2015		EML share of total volume in latest year (2015)	Comment
	EML	Non-EML		
HIV	-34%	21%	17%	Lack of infrastructure support leads to poorer implementation of EML and greater out-of-pocket expenses for patients
Diabetes	17%	22%	94%	Rise in diabetes incidence as well as awareness may be reasons for increased consumption
CVS	12%	7%	53%	-
Mental Health	5%	7%	47%	-
Malaria	–3%	4%	18%	-
Oncology	NA	NA	NA	The standard guideline of SA does not include oncology drugs
TB	32%	27%	66%	-
AI	10%	8%	53%	-

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About the QuintilesIMS Institute

The QuintilesIMS Institute leverages collaborative relationships in the public and private sectors to strengthen the vital role of information in advancing healthcare globally. Its mission is to provide key policy setters and decision-makers in the global health sector with unique and transformational insights into healthcare dynamics derived from granular analysis of information.

Fulfilling an essential need within healthcare, the Institute delivers objective, relevant insights and research that accelerate understanding and innovation critical to sound decision-making and improved patient care. With access to QuintilesIMS's extensive global data assets and analytics, the Institute works in tandem with a broad set of healthcare stakeholders, including government agencies, academic institutions, the life sciences industry and payers, to drive a research agenda dedicated to addressing today's healthcare challenges.

By collaborating on research of common interest, it builds on a long-standing and extensive tradition of using QuintilesIMS information and expertise to support the advancement of evidence-based healthcare around the world.

Research Agenda

The research agenda for the Institute centers on five areas considered vital to the advancement of healthcare globally:

The effective use of information by healthcare stakeholders globally to improve health outcomes, reduce costs and increase access to available treatments.

Optimizing the performance of medical care through better understanding of disease causes, treatment consequences and measures to improve quality and cost of healthcare delivered to patients.

Understanding the future global role for biopharmaceuticals, the dynamics that shape the market and implications for manufacturers, public and private payers, providers, patients, pharmacists and distributors.

Researching the role of innovation in health system products, processes and delivery systems, and the business and policy systems that drive innovation.

Informing and advancing the healthcare agendas in developing nations through information and analysis.

Guiding Principles

The Institute operates from a set of Guiding Principles:

The advancement of healthcare globally is a vital, continuous process.

Timely, high-quality and relevant information is critical to sound healthcare decision-making.

Insights gained from information and analysis should be made widely available to healthcare stakeholders.

Effective use of information is often complex, requiring unique knowledge and expertise.

The ongoing innovation and reform in all aspects of healthcare require a dynamic approach to understanding the entire healthcare system.

Personal health information is confidential and patient privacy must be protected.

The private sector has a valuable role to play in collaborating with the public sector related to the use of healthcare data.

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