

# Identification of Problems or Barriers in Medicine Procurement Process in Low- and Lower-Middle-Income Countries: A Narrative Review

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## ABSTRACT

Medicine procurement at LLMIC is still a challenge because of low medicine availability. As far as we know, no studies have identified the problems in the procurement of medicine in LLMIC countries, and thus it becomes the objective of this narrative review. Articles were retrieved from PUBMED, Science Direct, Google Scholar, PLOS from May 14<sup>th</sup>, 2021 to May 22<sup>nd</sup>, 2021 with a number of key words. There are 89 articles identified by a keyword or abstract, including in Indonesian (n=23) and English (n=10). The main problems include the absence of drug formulary system and pharmacy and therapeutics committee in hospital (selection), inconsistencies in disease and prescribing patterns, improper method of calculating the needs (planning), insufficient medicine stock, and long lead time (procurement). Factors such as lack of pharmacists (human resources), lack of budget for procurement (organization), no supporting management information system, and tender failure by the pharmaceutical industry also hinder medicine procurement. Efforts to solve this problem should include multi sectors to strengthen the medical management and the supply chain.

**Keywords:** supply chain, developing countries, medicine management

## INTRODUCTION

Medicine is a vital component in health system since it provides medication to the community, saves, and improves public health (Latifah *et al.*, 2018; Seidman & Atun, 2017). The availability of medicine significantly affects patients' satisfaction and perspective on health services (Bruno *et al.*, 2015) and becomes an essential dimension for access guarantee to this product (Soares *et al.*, 2019). The shortage of medicine increases health risks for patients due to insufficient medication. Therefore, access to medicine is a human right (Walker *et al.*, 2017).

Compared to high-income countries, low-income countries spend a greater proportion of total health expenditure on medicines. In low-middle income countries, total pharmaceutical spending varied from 7.7% to 67.6% of total health spending in 2006. Access to essential medicine is only 61.5% of certain critical medicine available at particular LMICs (Lu *et al.*, 2011). Weak and ineffective supply chain to serve patients in low-

income countries is putting treatment at risk and undermining the health system's ability to respond to the population's health care needs (Yadav, 2015). Moreover, according to Cameron *et al.* (2009), medicine availability in thirty-six developing countries is still low; it ranges from 30% to 54% on average in health facilities. Acute and chronic treatment is widely unaffordable (Cameron *et al.*, 2009). Affordability, availability, and shortages of drugs are complex challenges for the healthcare system, especially in LLMIC they are in fact related directly to medicine procurement. A previous study in LMIC suggests that an improvement of procurement and supply chain management can reduce costs and prevent supply shortages (Seidman & Atun, 2017). Identifying problems and barriers in the procurement process in LLMIC is the first step to finding the improvement to increase medicine availability and prevent shortages. To the best of our knowledge, no narrative review has attempted to answer this question. It is critical for all stakeholders in the medicine supply chain to

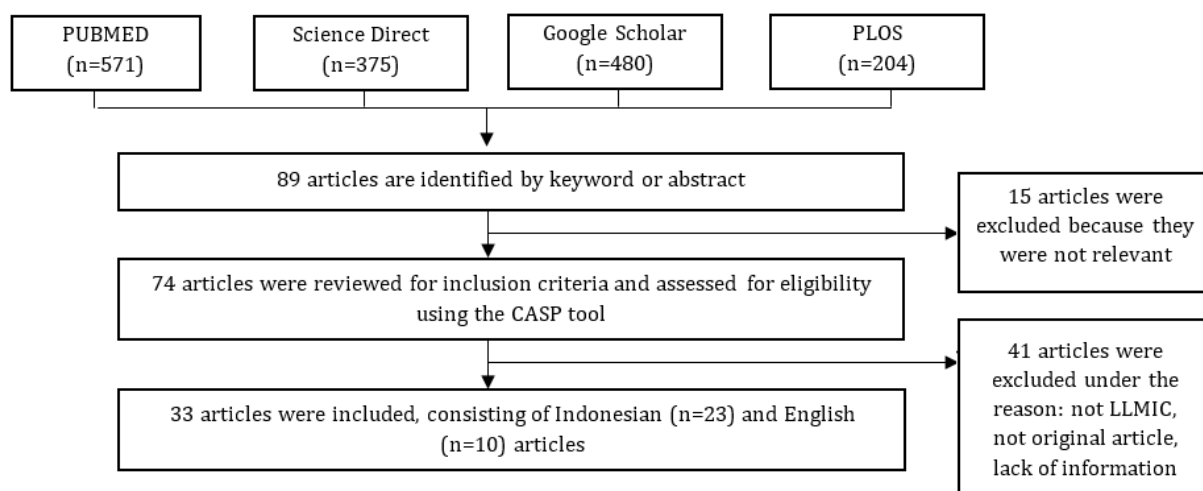


Figure 1. Flowchart of the literature selection process for narrative review

improve health system performance and maximize population health outcomes.

## MATERIAL AND METHOD

Deepening the understanding of the topic is the objective of narrative review (Greenhalgh *et al.*, 2018). A systematic review method was adopted to improve the narrative quality by reducing potential biases (Ferrari, 2015). This study was reviewed by three researchers and used a language other than English (LOE)(McDonagh M *et al.*, 2013). LOE can present more evidence and reduce the potential for the wrong conclusion (McDonagh M *et al.*, 2013; Morrison *et al.*, 2012). Stage 1 is developing research questions. The questions include hospitals, primary health care centers, and district or city health offices (Population), explaining problems or barriers in medicine procurement experienced by health facilities (Concept), and all issues in medicine procurement, including at the planning stage (Context). Stage 2 is searching for relevant studies. Published literature and free-full-text articles are collected from several databases: PubMed, Google Scholar, Science Direct, and PLOS, using specific keywords: #1 pharmaceutical\* OR medicine\* OR drug\* #2 procurement OR purchase\* OR plan\* #3 problem OR challenge\* (strategy: #1 AND #2 AND #3). The articles vary in age from 5 to 10 years (published between 2010 and 2020) as recommended (Cronin *et al.*, 2008; Gregory & Denniss, 2018), and is called preliminary filter.

Stage 3 is study selection (Figure 1). Three researchers independently reviewed the articles,

and a fourth researcher was assigned when taking decisions by consensus is needed. Inclusion criteria were original articles and peer-reviewed journals. Subjects or study perspectives were from hospitals, community health centers, regional health offices, or the government. Countries explored are registered as LLMIC countries according to the World Bank (<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>). An article is not selected if it does not present sufficient information regarding the research question or is less relevant. The quality of the selected articles is assessed using Critical Appraisal Skills Program (CASP), including an assessment of important areas of the published papers (Cronin *et al.*, 2008) which was then confirmed by the research team. Stage 4 is data extraction from each research by compiling a data-charting form, and then the topic of barriers is analyzed in procurement thematically.

## RESULTS AND DISCUSSION

A total of 33 original and full-text articles met the inclusion criteria and were reviewed. Compared to English articles (n=10), there were more Indonesian articles included (n=23). The total sample size was approximately 1,023 people from 10 countries: Uganda, Ethiopia, Somalia, South Sudan, Sudan, Kenya, Nepal, India, Tanzania, and Indonesia. Some papers have the publication year of 2019 (n=10) and 2018 (n=7). Articles in English were excluded because they were not original articles, such as article reviews or commentary articles, which were less relevant.

Table I. Study design and location

Study Location or Perspective		Study Characteristic	
Health Facility	n (sample)	Study Design	n (paper)
Hospitals (private, public, NGO)	98	Mixed-methods	10
Community Health Center	98	Qualitative	21
Health Department Office	59	Quantitative	2
Others	19		

The countries explored were middle-income and high-income countries. Most articles in Indonesian were also excluded due to lack of required information. Several studies with multi-country subjects where the majority were conducted in upper and middle-income countries were not included to reduce potential bias (Table I). More studies used qualitative study designs (n=21) than quantitative study designs (n=2). Qualitative studies were observed to have important health policy and practice research strengths. However, qualitative studies have limited scope, cannot be generalized, and consist of small sample sizes. Many studies in Indonesian did not provide sufficient socio-demographic information of participants. From all articles, only five acknowledged the study's limitations or the potential for bias during recruitment which may have affected the results. Efforts to reduce the bias were made, such as ensuring all participants were anonymous, confidentiality guaranteed (Shrestha *et al.*, 2018), and triangulation (Sunyoto *et al.*, 2019). Data collection in most studies was carried out through interview techniques, such as in-depth interviews, semi-interviews, or focus group discussions.

In terms of economic growth, particularly per capita income (Elistia & Syahzuni, 2018), the challenges in the health system in low and medium Human Development Index (HDI) are procurement problems and distribution systems (Lehoux *et al.*, 2018). Previous review studies imply that the procurement process has a significant impact on the optimization of financial and operational management in health facilities (Bastani *et al.*, 2019; Latifah *et al.*, 2018; Seidman & Atun, 2017). The procurement cycle includes selection and planning. Most actions specify the medicine quantities, prices, and the quality of the medicine. Procurement is the process of purchasing supplies directly from national or multinational, private or public suppliers, individually or in combination to meet the total number of pharmaceutical needs.

Procurement is considered effective if mechanisms for managing buyer-seller relationships ensure transparency and ethical transactions that result in buyers getting the right items and sellers receiving timely payment. Collaborative action is required between trained procurement staff and appropriate management systems, policy, and technical committees, who decide which drugs to buy, in what quantities, and from which suppliers (Barraclough & Clark, 2012). LMIC uses a variety of procurement mechanisms: centralized public procurement, decentralized public procurement, and private procurement. Supplier concentration varies widely across countries and regions, from single-supplier situations to a highly competitive environment (Dubois *et al.*, 2021). The following section discusses the problems and factors that cause procurement in LLMIC to be less effective and impact drug availability.

### Problems or barriers in selection

#### Qualitatives

Procurement can run smoothly from the selection and planning process. However, this process has to be effective and efficient, and should be supported by adequate management support (Table II). In the selection process, most hospitals in Nepal do not have a formulary. Medicine selection is only based on doctor prescriptions which are sometimes influenced by aggressive marketing by the pharmaceutical industry. Marketing behavior that drives the prescribing and sale of medicine is considered a significant challenge in many countries. Therefore, medical associations in the United States and Australia have been implementing strict codes of ethics or conduct to manage relations between medical professionals, including pharmacists and pharmaceutical companies.

In contrast, the Code of Medical Ethics developed by the Nepal Medical Council does not include ethical relations between healthcare professionals and pharmaceutical companies.

Table II. Problems/barriers to the medicine procurement process in hospitals, community health centers, and health offices in LLMIC

Stage	Problems or barriers
Selection	-No formulary system, list of essential medicine, or medication guidelines -No hospital pharmacy and therapy committee -There are still medicines that are not under the NF and the hospital formulary
Planning	-Lack of transparent and evidence-based medicine selection methods listed in the NF -Hospitals do not have the autonomy to regulate planning -Changing patterns of disease and prescriptions -Difficult to make forecasting -Planning methods and ways of calculating needs are not appropriate or not according to guidelines: lack of data
Procurement or purchasing	-The long and complicated tender administration process -Unclear procurement procedures, transparency of supplier selection and quality control -The ownership status of the hospital pharmacy installation -The too-small market volume for particular medicine -Long e-purchasing administration process -Private hospitals cannot access e-catalogue -Insufficient medicine stock, empty in e-catalogue or distributor -Inappropriate medicine received -Long lead time -Allocation of procurement funds has not been optimized -Access to medicine distribution and reports is problematic in certain areas -Certain needed or essential medicines are not available in the e-catalogue or NF -Lack of harmony between the list of medicine in the e-catalogue and standard treatment with NF
Organization	-Medicine procurement is outside the plan or the routine schedule -No organizational structure for procurement and planning team that functions optimally in the hospital -Lack of support from hospital management for the use of e-procurement system -Procurement agencies do not practice strategic buying -Inadequate infrastructure and facilities -Complicated or unclear policies and procedures -High dependence on private or state purchases of medicines -Lack of training for procurement and distribution staff -Lack of budget for medicine procurement and management -Provider performance is not monitored regularly
Management Information System	-No supporting management information system -Limited access to electronic information systems -The system has poor performance
Human Resources	-Absence or lack of pharmacists -Lack of professional, competent, and skilled human resources -Late or irregular, and incomplete reporting -Insufficient medical management administration, and the absence of stock card -Doctors do not use the formulary to regulate behavior -The e-procurement system developer is providing inadequate services

Australia and the United States also have codes of conduct that require disclosing details of promotional activities. Nepalese pharmaceutical companies and regulatory authorities could further

develop similar regulations to promote ethical medicine use. In line with the finding, there are personal reasons for prescribing medicine outside National Formulary (NF). One of them is because

Table IIb. Problems/barriers to the medicine procurement process in hospitals, community health centers, and health offices in LLMIC

Support Management	Problems or barriers
Others (government, distributor, industry)	<ul style="list-style-type: none"> <li>- Distributors cannot serve hospitals that have payment arrears</li> <li>- Distributors are not able to provide medicine with the amount and ED according to the contract</li> <li>- Single medicine provider in e-catalogue or shortage of multi-source producers</li> <li>- Lack of local suppliers and expansion is difficult</li> <li>- Limited stock or production capacity constraints</li> <li>- Suppliers are not ready to use the e-procurement system</li> <li>- Lack of socialization of medicine procurement policies through e-purchasing</li> <li>- The pharmaceutical industry does tender failure</li> </ul>

doctors feel there is no incentive to prescribe NF medicine. Doctors hope to profit from working with the pharmaceutical industry (Wasir *et al.*, 2019). Recent studies suggest that the interaction of physicians with pharmaceutical sales representatives is in terms of market and product knowledge, company, and mediation of rewards for prescribing physicians, which can directly influence physician prescribing behavior (Faisal *et al.*, 2020).

In Kenya, the standard guideline of treatment and lists of essential medicine are frequently not available in health facilities. If it is available, it is often not implemented. This could be because no pharmacy and therapeutic committee develops and oversees prescriptions (Mbau *et al.*, 2018; Shrestha *et al.*, 2018) which triggers medicine mismatch in stock with hospital and national formulary (Nesi & Kristin, 2018). An active committee is a requirement for hospital accreditation because of the importance of the committee's role in drug management in hospitals (Cicarello *et al.*, 2021). Standard guidelines regarding the committee's role, which is responsible for managing the formulary system, have been recommended by ASHP and the Joint Commission to support an effective drug selection process. Developing and implementing a drug formulary is a critical process that enables an organization to meet mandatory standards, ensuring that drugs are used safely, appropriately, and cost-effectively. Formulary evaluation is also an essential routine role of the committee to identify alternative products and the potential cost-savings of using generics at lower prices (Persson *et al.*, 2013). Even today, the role of KFT has expanded not only in

assuring quality but also in covering cost (reimbursements) and providing access (Vogenberg & Gomes, 2014). Pharmacists, nurses, physicians, and other organizational elements share responsibility with the P&T committee in improving clinical care and cost performance for the health system. Without an influential committee, cost-effective drug acquisition will be difficult to achieve.

In Indonesia, as the prescribers, doctors do not use the formulary to control prescribing behavior, leading to alter prescribing patterns (Ismedsyah & Rahayu, 2019; Nesi & Kristin, 2018; Roza *et al.*, 2019). The doctor's prescribing pattern is a factor that significantly influences medicine availability and can disrupt planning and procurement. This can also happen due to the limited knowledge of doctors about regulatory and basic knowledge of prescription writing. This is evident in India where doctors are not convinced that over-the-counter drugs do not require a prescription, that pharmacists are translators of their written prescriptions, and that they should not dictate prescriptions over the phone. Therefore, training in prescribing for doctors under global practice standards is needed (Imran *et al.*, 2020).

In addition, the lack of harmonization of medicine lists in the e-catalogue and treatment standards with NF makes some medicines unavailable in the e-catalogue or NF (Amiruddin & Septarani A, 2019; Karimah *et al.*, 2020; Makaba *et al.*, 2019; Wasir *et al.*, 2019). This may indicate the lack of transparent and evidence-based medicine selection methods listed in the NF. Therefore, the Ministry of Health (MOH) formed a Health Technology Assessment (HTA) committee, responsible for making recommendations

regarding NF. On the other hand, regulations determining standards for pharmaceutical services in hospitals need a hospital formulary and standard treatment guidelines to enable doctors to write prescriptions outside the NF.

#### **Problems or Barriers in Planning**

Planning aims to prevent vacancies or excess stock of drugs and maintain the availability of drugs in health facilities so that they are routinely carried out and evaluated by pharmacists. The planning stage consists of drug selection, collecting data on drug use in the previous period (consumption data), morbidity data, remaining stock, proposed drug needs from all service networks, compiling, calculating, and reporting drug needs plans with appropriate methods as well as budget preparation. If one of these components does not work well, for example, documentation of usage data is lacking, the next planning tends to be inappropriate.

Many factors influence planning and forecasting, making them a challenging and error-prone process. On the other hand, the commitment of countries to implement health insurance through a tender system requires a more careful planning stage (Maniadakis *et al.*, 2018). The pharmaceutical industry will refer to the number of planned drug needs in producing drugs. If the number of planned drug needs is lower than the realization, it can lead to drug vacancies or vice versa and thus the planning objectives are not achieved.

#### **Qualitatives**

Improper calculation of the medicine needs can also cause excess or insufficient medicine. Calculations based on consumption patterns without considering epidemiology are considered less accurate and may lead to irrational medicine use (Amiruddin & Septarani A, 2019; Sumiarni & Gustina, 2018). A specific method does not determine the estimated increase in demand (Hadidah, 2016). In addition, the Vital, Essential, Non-Essential (VEN) and ABC (pareto) calculations have not been implemented, and this triggers inefficiency in allocating funds (Mendrofa & Suryawati, 2016). In Saudi Arabia, a high-income country, poor drug inventory management systems also occur in many hospitals, including inaccurate demand forecasts as one of the causes of drug shortages (Alruthia *et al.*, 2018). MOH has regulated the methods and ways of calculating pharmaceutical supply planning, although in its implementation each agency or region has the authority to regulate them.

Inconsistent disease patterns lead to planning deviations (Ismedsyah & Rahayu, 2019; Nesi & Kristin, 2018). If the number of disease cases decreases, the number of procurements is fewer than the planned need for medicine, and vice versa. Efforts were made based on the top 10 diseases in the selection and planning process. Differences in planning methods between related work units can cause confusion. In Indonesia, the community health center is the medicine user, and the health office is the supplier. Suppose the community health center uses the consumption method, while the health office is not regulated. In that case, it can result in the number of procurements made by the health office not as requested or the community health center may experience shortages (Nibong *et al.*, 2017). In East Africa, list of visceral leishmaniasis (VL) medicine is limited to one source only, and quality assurance of medicine is scarce. In addition, historical data or previous consumption is difficult to use due to fluctuating cases. Furthermore, the number of cases in South Sudan is not documented, and in Kenya meetings to coordinate the needs planning is difficult to achieve. Unsatisfactory reporting also makes it difficult to properly plan medicine needs (Sunyoto *et al.*, 2019).

#### **Mixed methods**

The planning process faced several barriers, as taking place in Uganda. Regional referral hospitals did not have the autonomy to regulate the purchase plan of medicines. They were not involved in determining the number of resources allocated to purchase medicines. There were many complaints about medicine void and expired medicine in hospitals due to insufficient funding (Masembe, 2016).

Furthermore, the method of planning based on needs was inaccurate because the medicine void and the IFA request were not well documented. Other reasons were lack of buffer stock, unanticipated delivery delays from suppliers, and placement of orders if they were completely out of stock. Therefore, standardized demand forecasting is needed based on accurate estimates of district needs and previous consumption. It should take into account the estimated population of breastfeeding women, IFA distribution times, computerization and clear documentation of stock, demand, expiration dates, implementation, monitoring, and evaluation of buffer stock needs (Wendt *et al.*, 2018). Inaccuracy occurs because the initial stock is not taken into account, so the level of most medicine availability is in the excess

category (Taulabi *et al.*, 2019). The lack of accurate data for medicine planning at the district level causes the suitability of medicine with disease patterns in community health centers to be low (Caroliën *et al.*, 2017). The incompatibility in the data input process could cause planning deviations. In principle, several theories such as the formation of a planning team, the use of consumption method, epidemiology, or a combination of consumption-epidemiology, and the ABC-VEN analysis may become options to formulate the amount of drug requirement in an effective budget.

### **Problems or Barriers in Procurement Mixed method and quantitative**

Procurement problems may root from distributors, including long delivery time for ordered medicine (Mackintosh *et al.*, 2018; Waluyo *et al.*, 2015; Wendt *et al.*, 2018), and difference in the number of procurements from what is planned. It is related to the lack of local suppliers, which reduces access to rural areas. From the health office's side, sometimes procurement of medicine outside the plan or the standard schedule set may cause overstock. For example, the presence of medicine close to the expiration date which results in the health office providing large quantities of the medicine without any request from the community health center (Athijah *et al.*, 2010; Roza *et al.*, 2019).

### **Qualitative**

Medicine procurement in hospitals can use a direct or competitive procurement model either through an open bidding process or competitive negotiations for the best price. In Nepal, hospital pharmacy installations usually adopt the competitive procurement model, while private hospital pharmacy installations adopt the direct procurement model. The problems in the procurement process in some hospitals that use a competitive procurement model include long and complicated administrative procedures, larger order quantities, time and cost required for the bidding process. A centralized tendering system or joint procurement has been recommended to achieve price reductions, improve quality assurance and minimize corruption. This model has been successfully applied in various countries. The nature of ownership of hospital pharmacy also hinders pharmacists' participation, that is, pharmacists do not control the procurement of medicines but the owners themselves who buy medicines to maximize profits. Unclear

procurement procedures and supplier selection and quality control transparency also become problems in Nepal. It is a prerequisite for transparent, professional, and ethical procurement practices. According to WHO, a limited tender procedure open only to qualified suppliers is considered the best procurement model for small countries like Nepal. An open tender system without pre/post evaluation of supplier bids is not under WHO recommendations (Shrestha *et al.*, 2018).

At the beginning of the implementation, it was found that the e-catalogue could not be accessed by private hospitals (Mendrofa & Suryawati, 2016) because of the concern that the profit margin was too large to be taken by the private sector considering the lower price of e-catalogue. However, it is now possible. Another problem found was when receiving insurance medicine where the medicine did not match the order, such as the price and the quantity (Citraningtyas & Mumek, 2017; Suryantini *et al.*, 2016). Contract changes regarding delivery time are also considered a procurement constraint (Makaba *et al.*, 2019).

Procurement hampered by too small market volume for a particular medicine becomes the concerns of industry representatives. For example, VL medicine in East Africa coupled with a shortage of multi-source production capacity and complex supplier expansion. The market is shrinking as the caseload declines in South Asia. VL Pharmaceuticals is a relatively small segment of the medicine portfolio, and without a good need, halting production is a reasonable scenario. However, all industry representatives express their commitment to continue producing VL medicine as an expression of corporate social responsibility (Sunyoto *et al.*, 2019).

The implementation of a centralized tender system that has been implemented in Indonesia reduces the frequency of procurement of competitive models that are carried out independently by hospitals. The government's commitment to include all people in National Health Insurance increases the need for insurance medicine procured through e-catalogue and e-purchasing. The need for a large amount of insurance medicine may cause some problems, including insufficient medicine stock for all health facilities which may result in medicine void in e-catalogues, distributors, or at a national level (Awal *et al.*, 2020; Friska *et al.*, 2019; Kalsum, 2019; Karimah *et al.*, 2020; Makaba *et al.*, 2019; Mendrofa

& Suryawati, 2016; Nibong *et al.*, 2017; Saputra *et al.*, 2019). Consequently, hospitals are forced to carry out manual procurement, which is more expensive. The failure of e-purchasing causes inefficiency in the hospital budget. It is in line with the finding that there is only one provider for some medicines in the e-catalogue (Kalsum, 2019; Sulistiyono *et al.*, 2020) or lack of multi-source producers. In addition, orders by many work units or health centers at one time cannot be served by distributors (Risa *et al.*, 2020) due to limited stock or production capacity constraints in the pharmaceutical industry (Sulistiyono *et al.*, 2020). This may trigger shortages in health facilities.

In the US, several reasons for drug shortages are manufacturing problems (23%), supply or demand problems (13%), and “unknown” causes (55%). Manufacturing problems include shifting company resources from manufacturing to research and development, changes in product formulations and limited production capabilities which can also delay product availability. Furthermore, the use of the same manufacturing equipment for many medicinal products makes it difficult to increase production of a single product without causing production shortages and delays for other products. Conditions are even more difficult when the only major raw material supplier delays or stops production. Even if there are many drug manufacturers, there may only be one producer of the raw material. Therefore, any disruption in the supply of raw materials will affect all of the finished product producers. It is common knowledge that the main raw material suppliers are from Europe, India, or China. If one of the suppliers in these countries has problems, the drug distribution chain is in trouble in the US. Sometimes, the demand for drugs can increase beyond expectations or production capacity, which is an issue of supply and demand, for example, when there is an approval of a new indication for an existing product, changes in therapeutic guidelines, the spread of disease, or other unforeseen factors. Other causes related to business and economic and regulatory issues include insufficient profits for the industry, market share, expiration of patents, drug registration status, and others (Ventola, 2011). Production problems and the availability of raw materials are also the cause of drug shortages in Italy, France, Germany, Belgium, the Netherlands, England, and Spain (Pauwels *et al.*, 2015). Similar problems are also experienced by LMIC countries such as Indonesia, Nepal, and East Africa.

## **Problems or Barriers in Human Resources**

### **Mixed method**

Because of the absence or lack of pharmaceutical personnel, procurement officials are not pharmacists (Carolien *et al.*, 2017; Mahdiyani *et al.*, 2018; Wendt *et al.*, 2018). Moreover, they are not available in some remote regions, so they have to do concurrent tasks. Lack of medicine managerial skills in calculating the needs of medicine may affect medicine supplies at the community health center (Carolien *et al.*, 2017). It may be because the personnel are not trained and have not worked long enough, so they do not understand their authority and responsibility in management (Waluyo *et al.*, 2015).

### **Qualitative**

The shortage of pharmacists is also reported in many qualitative articles as barriers related to human resources (Nesi & Kristin, 2018; Saputra *et al.*, 2019; Sulistiyono *et al.*, 2020) alongside the lack of professional, competent, and skilled human resources (Amiruddin & Septarani A, 2019; Hadidah, 2016; Kalsum, 2019; Makaba *et al.*, 2019; Sumiarni & Gustina, 2018; Sunyoto *et al.*, 2019). The community health center staff may consider preparing the demand planning for medicine a routine that does not have to be realized in the medicine procurement, which may lead to procurement without going through the planning process (Sulistiyono *et al.*, 2020). Planning officers tend to pay less attention to the amount of inventory ordered, whether the amount is still sufficient for use in the next period. On the other hand, the recording and reporting of pharmaceutical supplies are incomplete or are not carried out thoroughly and on a regular basis (Hadidah, 2016). As a consequence, it may lead to inaccurate planning data and insufficient administration, such as no stock control card.

Although human resources play an important role as it underpins every function of the health system, the findings above show that LMIC are still lacking personnel and human resources development. This prevents the staff from working optimally. The Millennium Development Goals must be addressed to achieve universal health coverage by 2030. WHO sets the minimum ratio of health workers to population is 2.5 per thousand. There are at least 57 countries with a suboptimal ratio of health workers; 63% are in Africa. The three dimensions that must be overcome are health workers' availability, distribution, and performance. Various efforts to develop human health resources are carried out in



various countries although they are encountering various obstacles (Freer, 2017). Conditions are not much different in Ghana, Ethiopia, and Lebanon.

In Ethiopia, several problems were identified, including a lack of coordination from stakeholders and the need of an overall career development strategy to retain human capital (Sporrong *et al.*, 2016). In Lebanon, an upper-middle-income country, poor working environment, financial constraints, and lack of professional development are also reasons for labor retention difficulties. Barriers to recruitment resulting in a sub-optimal supply of human resources, financial constraints, and poor management are also challenges (Alameddine *et al.*, 2016). In both Lebanon and Ethiopia, the greatest challenges are in rural areas, including transportation of goods and personnel, attracting and retaining personnel, and communication and access to information that can compromise access to quality services. A study in Ghana also reported that in rural areas low satisfaction, heavy workload, difficult working conditions, lack of professional progress, and lack of educational programs such as structured mentoring, were experienced by the workforce (Kwansah *et al.*, 2012). Therefore, it is necessary to design a system that can identify, train, allocate and retain health workers appropriately and with serious attention to rural areas.

### **Problems or Barriers in Organization**

#### **Mixed method**

Unclear procedures for requesting medicine to sub-health centers and stock control (Wendt *et al.*, 2018) or methods in medicine management have not been made and implemented by organizations (Waluyo *et al.*, 2015). Other problems are lack of staff training on procurement, distribution, and use of the e-procurement system (Ateto *et al.*, 2013; Mackintosh *et al.*, 2018; Tumwine *et al.*, 2011), Lack of budget for procurement, including distribution costs to remote areas, is also a stumbling block (Carolien *et al.*, 2017; Mbau *et al.*, 2018; Nibong *et al.*, 2017; Roza *et al.*, 2019; Sumiarni & Gustina, 2018).

#### **Quantitative**

Lack of support from hospital management for using the e-procurement system shows the organization's inability for management change (Ateto *et al.*, 2013).

#### **Qualitative**

Some problems occur because there is no organizational structure for procurement and

planning teams do not seem to function optimally in hospitals (Nesi & Kristin, 2018; Saputra *et al.*, 2019). It causes unclear coordination and ineffective communication at various levels (Sunyoto *et al.*, 2019). Because the hospital does not have certified procurement staff, all members of medicine procurement team come from outside the hospital (Nesi & Kristin, 2018). Procurement which is not in accordance with strategic purchasing, the government which has poor accountability, and supervision and monitoring of provider performance which are not regularly carried out may reduce medicine procurement's efficiency and effectiveness (Mbau *et al.*, 2018). Dependence on purchasing medicines, both the finished product and raw materials, from private or other countries is high, such as in Nepal and East Africa. The complicated regulatory policies and procedures frequently lead to shortages at the health facility level in East Africa (Sunyoto *et al.*, 2019). Triggered by the failure of several community health centers to carry out e-purchasing without follow-up, special regional regulations for the procurement process are greatly needed (Sulistiyono *et al.*, 2020). Inadequate facilities and infrastructures, such as computers, printers, modems, networks, and electricity (Kalsum, 2019; Makaba *et al.*, 2019), and limited access to electronic information systems hinder the procurement process in certain areas.

### **Problems or Barriers in Management Information Systems**

#### **Quantitative**

Suppliers who are not ready to use the system and inadequate e-procurement system developers in providing services also delay the adoption of e-procurement in Kenya. It is unprofitable for the organization (Ateto *et al.*, 2013). Less systematic medicine management is considered less effective and less efficient in optimizing the procurement process.

#### **Qualitative**

Manual management is still widely found at various levels of health facilities in different LLMIC countries. There is no management information system to support the controlling stock, so orders are often not on schedule (Nesi & Kristin, 2018). If any, the system has poor performance, for example the data is not adequately protected from unauthorized access, lack of confidentiality of information sent, and slow upload and download speed. Moreover, the performance of the e-purchasing system is also poor, such as missing

information in the system and frequent errors (Karimah *et al.*, 2020).

In contrast, the existing information system in developed countries such as the US, may already have good performance and rarely makes error. However, the lack of a sophisticated warning system is one of the main causes of drug shortages in the US. Pharmacists need to have reliable and timely information systems to manage drug shortages successfully. In addition, the system needs to involve the FDA, distributors, and manufacturers. Currently, manufacturers are free to give notice or not unless they plan to stop producing a single medically necessary drug. In this case they must provide the FDA with six months' prior notice. Manufacturers are also not penalized for failing to provide notice where drug discontinuation is often due to business decisions or other factors (Ventola, 2011). Lack of government regulations mandating early notification 6 months in advance of drug shortages is the reason for the shortage of drugs in Saudi Arabia (Alruthia *et al.*, 2018). Researches in European countries demonstrate that the role of governments in enforcing mandatory prior notification and centralized information can help reduce the workload of hospital pharmacists, allow early anticipation of drug shortages, and facilitate mitigation of clinical impact on patients (Pauwels *et al.*, 2015). Ideally, there should be an early warning system to prevent future shortages of medicinal products, thereby providing sufficient opportunity to prepare for all the implications of such shortages. A systematic, user-friendly, and well-performing drug procurement system is needed to expedite the procurement process.

#### **Problems or barriers from influential parties qualitative**

The distributor's problems occur when the distributor cannot serve hospitals with payment arrears. The majority refuse orders from public hospitals due to fear of long payment delays. Needless to say, hospitals also experience distributors not providing medicine with the amount and expiration under the contract because not all providers are available with buffer stock (Awal *et al.*, 2020). Socialization of e-purchasing is still lacking, and considering that the policies often develop, socialization needs to be improved regularly (Kalsum, 2019). From the pharmaceutical industry, several industries are unable to supply medicine because of the unavailability of raw materials and the pricing being inaccurate or too low, often resulting in tender failure (Citraningtyas

& Mumek, 2017; Suryantini *et al.*, 2016; Wasir *et al.*, 2019). Pharmaceutical companies compete for low bid prices to win tenders and get the right to distribute medicines throughout Indonesia. Thus, encouraging the pharmaceutical industry to reduce operating costs may raise pharmacists' concerns about drug quality. In Saudi Arabia, no institution investigates providers after winning the tender. Problems related to low-profit margins of some essential drugs mean that eventually the pharmaceutical industry may be forced to stop producing certain products vulnerable to shortages of drugs occurring (Alruthia *et al.*, 2018). In Fiji, an upper-middle-income country, very few suppliers can meet the set price, increasing the risk of being out of stock (Walker *et al.*, 2017). Substantial attention to this pricing issue from the National Health Insurance Body and MOH is therefore needed.

#### **Proposed Action**

There are several recommendations to overcome barriers in the procurement process at LLMIC, which aim to strengthen supply chains and increase medicine availability. They include adopting and regulating national and international policies which are recommended to improve the accessibility of medicines and preparedness for health emergencies (Shrestha *et al.*, 2018). The government should strengthen accountability mechanisms, increase funds for medicine, assess infrastructure needs, and make appropriate investments. If necessary, the government is advised to explore the possibility of collaboration between countries to utilize shared resources, especially for expensive medical equipment and specialized health personnel, and strengthen health management information systems (Mbau *et al.*, 2018). Hospital pharmacy is encouraged to be involved in the national medicine planning and procurement process (Masembe, 2016). Suggestions for improving policies that facilitate increased use of e-catalogue and NF are increasing physician compliance with prescription guidelines (Mbau *et al.*, 2018; Nesi & Kristin, 2018; Shrestha *et al.*, 2018). It is necessary to improve the function of the pharmacy and therapeutics committee to carry out standardized drug selection (Mbau *et al.*, 2018; Shrestha *et al.*, 2018). It is also important to upgrade the role of the planning team to provide adequate pharmacists and to increase their knowledge and skills (Carolien *et al.*, 2017). Implementing a real-time management information system is necessary to minimize the administrative

process and facilitate medicine management (Sulistiyono *et al.*, 2020).

To find more problems and more countries, the authors include the findings in Kenya and Tanzania from Mackintosh *et al.* (2018), which also involve pharmacies and drug stores perspectives that are not included in the research questions. However, it may trigger a bias in the results. Another limitation of the study is the small number of LMIC countries analyzed, possibly influenced by limited keywords. However, the authors agree not to include multi-country studies in which developed countries were analyzed to reduce further bias in the results.

Although this review was not intended to assess the quality of the included literature, the authors used the CASP tool to ensure the quality of the essential components of the journal. Thus, the findings of this review are based on the availability of the studies rather than their intrinsic quality. Nevertheless, this narrative review presents a broad overview of the existing research on pharmaceutical procurement issues. It provides the basis for further discourse and research on multifunctional efforts to optimize drug procurement quality.

## CONCLUSION

Low medicine availability at LLMIC is directly related to complex procurement and planning processes. The absence of the pharmacy and therapeutics committee in the hospital may cause irregular medicine selection and inconsistent prescribing patterns. Planning difficulties result from weak procedures, administration, methods, and calculation of medicine needs. The implementation of e-procurement which has not been optimal in terms of commitment and integration between stakeholders in the medicine supply chain needs to be improved.

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