State of Pharmacoeconomic in Low Income Countries: A Case Study of Yemen

Mohammed Alshakka[1*] • Thamir Alshammari [2] • Mukhtar Ansari [3] • Adel Aldhubhani [4]
Heyam Ali [5] • Mohamed Izham Mohamed Ibrahim [6]

[1] Section of Clinical Pharmacy, Faculty of Pharmacy, Aden University, Aden, Yemen
[2, 3] Department of Clinical Pharmacy, College of Pharmacy, University of Hail, Saudi Arabia
[4] Department of Pharmacy, Ministry of Public Health (MOPH), Sanaa, Yemen
[5] Department of Pharmaceutics, Dubai Pharmacy College, Dubai, United Arab Emirates (UAE)
[6] Clinical Pharmacy and Pharmacy Practice Section, College of Pharmacy, Qatar University, Qatar
Alshakka400@gmail.com

Abstract: Pharmacoeconomics constitutes an area of health care research that assesses and compares the costs and outcomes related to drug therapy. The article's main aim is to stress the importance of the use of pharmacoeconomic research and pharmacoeconomics education in Yemen and in the curriculum carried out in Yemeni pharmacy schools. The article talks about the concept, the importance of pharmacoeconomics in low-income countries, the contributions made by pharmacoeconomics to pharmacy practice, pharmacy education in Yemen and the need to have proper pharmacoeconomics in Yemen. Conclusively, the Pharmacoeconomic research if implemented in Yemen, it will play an increasingly important role in making critical decisions concerning options that can be made regarding drug therapies and pharmaceutical services. Also, Pharmacists and future pharmacists should have a fundamental understanding of pharmacoeconomic concepts and the research methods employed to use the information gained from this rapidly growing field most effectively.

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1. Introduction:

In correspondence to the latest awareness by the public about the increasing health care costs, at the same time, there has also been an increased interest in evaluating drugs' benefits. This interest is manifested in the steady stream of pharmacoeconomic studies that have been published in the primary literature for the past decade(Johnson & Coons, 1995).

The increasingly important role of pharmacoeconomics in making critical decisions concerning options with regard to drug therapies and pharmaceutical services has led the need for pharmacists to have a basic understanding of pharmacoeconomic notions and the research methods employed to use the information gained from this fast-growing field most effectively.

The economic evaluation may help make the decisions about which interventions are feasible enough for funding and which are to be averted. The overall aim of these methods is to elevate the level of efficiency in the use of scant health resources to improve public healthcare. Pharmacoeconomics is a sub-branch of health economics that primarily deals with pharmaceuticals; it includes any study which compares the costs (resources consumed) and consequences (health and welfare) of a wide range of pharmaceutical products and services" (Bootman, Townsend, & McGhan, 1996).As of today, pharmacoeconomic analysis facilitates decision-makers in various jurisdictions all around the world where decisions have to be made about whether a drug should be listed in national or hospital formularies. It also helps the pharmaceutical industries to make prior decisions on which drugs to develop and how prices should be fixed in the market (Bootman, Townsend, & McGhan, 1996).

2.Pharmacoeconomics in Low-Income Countries:

In 1998, the WHO-CHOICE project was first introduced to increase the use of economic evaluation evidence in healthcare decision-making in settings that lack resources(Evans et al., 2005). The goal is to give evidence for policy-makers about which interventions couldyield the greatest health gains from that much resources. It is estimated that between 20 and 40% of scarce health resources in low-income countries have gone to waste, and this has been identified as a major impediment that can help achieve universal health

coverage (World Health Organization, 2010). It can be argued that inconsistent use of pharmacoeconomic analysis could be a contributing factor towards the poorly used scarce resources in low-income countries. It is important to bear in mind that not all the new drugs approved and promoted by drug companies possess the added clinical benefits as claimed over the existing alternatives. In fact, some are more harmful as they also have side effects (Light, Lexchin, & Darrow, 2013).

It has been reported that less than 30% of new drugs approved in France had better therapeutic properties than the existing drugs (Anonymous, 2011). This raises so much concern among the low-income countries, where drug regulatory frameworks have a greater sense of frailty than those in high-income countries.

3.Yemen's Healthcare System:

Yemen is an Arab country based on the southern tip of the Arabian Peninsula. The population is 24 million, and 70% of them are rural residents. Despite having many healthcare services (either public or private) on the major cities, primary health care centers and polyclinics are scattered nationwide, and the rural areas are no exception.

Some health challenges in Yemen are worrying, and they are both the high incidence of communicable diseases (e.g. malaria, tuberculosis, schistosomiasis, sexually transmitted infections and vaccine-preventable diseases) and non-communicable diseases (e.g. cardiovascular diseases, renal problems, cancer, and eye diseases). Not only that, Yemen is known for its high prevalence of lifestyle-risk factors (including tobacco use, 'qat' chewing, malnutrition, injuries, and accidents) and the poor level of sanitation (especially water sanitation).

A steady body of literature has provided evidence that there have been many challenges that have to be answered to in the pharmaceutical sector across all divides in Yemen. A quick look at how it all started, its current state and some suggestions as to how to improve the problem will all be arranged so that relevant parties can take a holistic view on it. By carefully studying the state of Yemen's health status which had contributed to the current predicament in the pharmaceutical industry, a better understanding of the overall scenario of the pharmaceutical industry in Yemen may be able to be achieved.

There are public and private healthcare systems in Yemen. Under the public healthcare system, a minister will be in charge of this welfare sector. (World Health Organization, 2006). Meanwhile, private healthcare in Yemen includes various forms of establishments, which consist of the following:

1) Public/ private interactions with the government doctors running their own clinics.
2) Institutional establishments.
3) Traditional medicine with natural treatment using plants and minerals, as well as ones influenced by religious and traditional values.
4) Modern establishments set for profit and are largely owned by employees from the ministry of public health.
5) Modern non-profit establishments which are mainly started by local and overseas non-governmental organizations (World Health Organization, 2006).

4.Yemen's Health Status:

With low birth weight rate of 32% (Johnson & Coons, 1995; Bootman, Townsend, & McGhan, 1996) and under nutrition of 39%, Yemeni children have to live with a protracted humanitarian situation and chronic underdevelopment, which continues to be dampened by political instability and multiple localized conflicts (MacQuarrie, 2014). One may safely say that the life of a Yemeni who is just beginning is not really promising. The poor health care situation is contributed by poverty, lack of proper space for baby delivery, low health awareness, costly and inaccessible health care facilities and to water and sanitation, and not to mention the poor level of education(World Health Organization, 2006).

The maternal mortality rate is 148 for every 10,000 live births and the total fertility rate 4.4, which is among the highest in the world (MacQuarrie, 2014). This makes one major problem since Yemeni resources are not able to keep up with the fast-growing population (UNICEF, 2014). The Yemenis have been suffering from common illnesses which include diarrhea, malnutrition, complications from pregnancy, acute respiratory infections and malaria, while AIDS, cancer, trauma and heart disease and the rate of illnesses is escalating (World Health Organization, 2006).

It is believed that there is an indirect link between socio-cultural elements and the higher rate of illnesses. The total percentage of literacy stood at 53% in 2013 whereas the percentage of female literacy was at a mere 31% in 2013.

Most Yemenis have to live in harsh economic and social conditions caused by the political conflicts rife in the country. It also needs to address its long-standing unemployment issue for an extensive time, leading to an increasing poverty rate especially after the 2011 revolution. Relatively speaking, Yemen has the highest unemployment rate in the Middle East and North Africa. This situation does not sit well with the expectation that young people are most likely to suffer from poverty and malnutrition.From the World Bank, unemployment reached 17% in 2010. The ratio of unemployed females to males was 54%and 12% and this remained high among adolescents at 60%.This was noted after the revolution in 2011when 42 percent of households had to be under the poverty line (World Bank, 2015). This helps explain Yemen's position being at the 154th among the 187 countries in the Human Development Index in 2014 (UNDP, 2014).

Nonetheless, Yemen is the one country that adopts a three-tier health delivery system comprising of health units, health centers, and hospitals. These facilities have

increased health coverage for the Yemeni people of up to 67% in 2010 from 45% in 1990 although there was only a 35% increase in the rural areas (Evans et al., 2005). In the same vein, there is an increase in the number of the health workforces in the health manpower institutes. Meanwhile, where the private and public universities are concerned, a degree of improvement has also been observed(World Health Organization, 2006).

This present situation is very much different from the time when Yemen's health system was supervised properly. Back then, problems such as poor services, demotivated staff, lack of essential drugs, inefficiency, resources being mishandled, under-funding by the government also poor equity in the facility and workforce distribution (Reeder 1995). The underlying causes behind this situation can partly be traced to the economic downturn which peaked in the early 1990s and factors such as low productivity, increasing inflation, devaluation of the Yemeni Riyal, an over- bloated public sector that is inefficient, the rise of poverty, a high unemployment rate and a heavy foreign debt (World Health Organization, 2006).

However, Yemen had managed to temporarily stop it in 1995 by starting an economic reform program, backed by the World Bank and the International Monetary Fund. Such a change was only temporary as 1998 was also the year that the petrol prices dropped, forming 68% of the total revenue. This incident had caused 15% budget cut in the public sector (World Health Organization, 2006). The Gross Domestic Product (GDP) in Yemen was worth 35.95 billion US dollars in 2013. The GDP value of Yemen was the depiction of 0.06 percent of the world economy.

GDP in Yemen averaged 15.17 USD Billion from 1990 until 2013, reaching an all-time high of 35.95 USD Billion in 2013 and a record low of 4.17 USD Billion in 1994 (Trading Economics, 2017; The World Bank, 2012). As of 2007, the annual expenditure on health totaled USD 1,139.87 million, which was 5.23 percent of the GDP. The total annual expenditure per capita on health totaled USD 60. Meanwhile, the total expenditure for the pharmaceutical industry in 2007 was USD 392.14 million, with a per capita expenditure of about USD 18.46, accounting for 2.11 of the GDP (The World Bank, 2012; Profile, 2008).

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5.Yemeni Pharmaceutical Sector:

There are about 500 foreign pharmaceutical companies and more than 13,000 brand medicines registered in Yemen (Al-Worafi, 2014).The local pharmaceutical industry was represented by 10 drug factories in Yemen The local pharmaceutical industry represented about 10–20 per cent of the total market. Pharmaceutical drugs require US$263 million a year citing the national Supreme Drugs Authority. The cost has gone to bringing in medicines from 50 countries through 400 importers.

The Supreme Board of Drugs and Medical Appliances and the Ministry of Public Health and Population are the parties that regulate the pharmacy practice, registration, and drug procurement. In 2011, there were 3,315 pharmacies (licenses issued for pharmacists) and 4,133 drug stores (for pharmacy technicians) (Al-Worafi, 2014).

Despite Yemen's expansion and improvement of its health care system over the past decade, the system is still very much underdeveloped. For improvement, many changes are vital, some of which include keeping tabs of the pharmacy curriculum taught, carrying out the standards for pharmacy practice, executing and/or reinforcing pharmacy laws and regulations, also integrating pharmacists more comprehensively in the healthcare system as part of the healthcare professionals.

In addition, and as a whole the quality of the pharmacy workforce necessitates improvement, and awareness raised among the relevant parties.Everyone, from the MOPHP, the policy makers, to healthcare professionals and the community have to have some education about pharmacovigilance, the negative effect of drugs and the danger of its exposure. The task is not easy, but it can help the Government pay attention to, and act upon, the different pharmaceutical related challenges and possibly make a change to Yemen's healthcare system (MoPHP, 2010; Alshakka et al., 2014)

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7. The State of Pharmacoeconomics in Yemen

Low-income countries, including Yemen, are no strangers to an intense scarcity of health resources to address the heavy load of communicable and non-communicable diseases. Health policy-makers and politicians are all trying to find new approaches capable of closing the existing gap between the extent resources and unmet health care needs.

The pharmacoeconomic analysis serves to raise the efficiency of resource allocation to drug therapies in high-income countries. Although formulary decisions involving the use of newer and more costly drugs are constantly being performed in Yemen, little is known about how and to what extent pharmacoeconomic analysis has been used to steer such decisions.

Pharmacoeconomics is a relatively new area of health economics in Yemen. It mostly concerns with how we, individuals, society and governments, have opted to use fixed resources.

Pharmacoeconomic studies find value in:

1. Setting the price of a new drug and re-setting the price of an existing drug.
2. Finalizing a drug formulary.
3. Creating data for the promotional materials of medicines.
4. Adhering to the requirement for drug license.
5. Including a drug in the medical/insurance reimbursement schemes.
6. Introducing new schemes and programs in hospital pharmacy and clinical pharmacy.
7. Performing drug development and clinical trials.

8. Yemen pharmacy Practice and pharmaco-economics

Health economics is a tool that prioritizes the interventions of various competing health care sometimes to provide these solid resources, thereby treating health care as a commodity. It has to be said, however, that health care is not as easy as some other products, as recently mentioned in the case of Herceptin, due to the fact that politicians are dabbing into this decision-making process as well.

Pharmacoeconomics helps us decide about ways of using medicines. Most of the pharmacoeconomics studies in health care studies are provided to offer a cost-benefit ratio to illustrate how the goal is to be realized with less resource input. It should not be confused with the efficiency that the extent of our use of resources in order to get the result we want.

Pharmacoeconomics applies to all stages of drug development by the pharmaceutical industry when the search for drugs, production, and marketing is used. Some countries have looked into the pharmaceutical industry when it comes to the approval phase. Most pharmacists in hospitals resort to the medical science pharmacy to help with the decision making formulas, and how it can be used inexpensively and efficiently.

In terms of the drug quality, efficacy and safety are a prerequisite for drugs and regulation of licensing. To put simply, we need to give evidence of the efficacy of treatments for specific disease and associated costs compared to the federal authority prior to its introduction into the market.

The economy has shown that many pharmaceutical applications are possible and feasible. The pharmacoeconomics can help with the affordability and access to appropriate medications for the right patients at the right time, compared to two drugs in the same therapeutic category or a drug with a similar mechanism in terms of assessing the economy in the decision-making stage.

The pharmacists' practice in the community, in clinical and attitudes in Yemen, can benefit greatly in the normal practice attitudes from the application of the principles of the pharmacoeconomics. Proper application of the economy will allow pharmaceutical practitioners and administrators to make the wisest of decisions and better informed about the products and services offered. Traditionally, the drug therapy decisions are based solely on clinical outcomes such as safety and efficacy, but Pharmacotherapeutics teaches us that there are three most important outcomes namely clinical, economic and humanitarian in drug therapy. It is universally accepted that the right decisions when selecting drugs cannot be done today if it is only on the basis of the purchase costs. It can be applied to help economics in decision-making, in deciding on the affordability of medicines and comparing different products to treat the disease. It will also give the proof on the promotion of certain types of medicines and cost-intensive services.

Pharmacoeconomics would be apt for health policy making decisions and can be applied to a number of health care professionals such as providers of primary health care managers, health managers themselves and health care workers. It is often visited by the providers of basic medical supplies, usually in large quantities, with many new drugs from the same class, to add to the existing drugs. The introduction of new drugs can confuse doctors and administrators as they are not sure about the wise choice and rational use of medicines. Upon the introduction of

new drugs, the results must be the same or more effective and the new drugs must have some economic benefits or similar to the drugs they already have.

The evidence on the pharmacoeconomics can help pharmacists and policymakers to decide about the use of medicines and healthcare stages. The knowledge of the health economy also the political insight are important to understand the allocation of resources and expenditure in the modern health system. Thus, it is safe to say that the knowledge of health economics and application of its techniques is vital to the pharmacists today.

The use of pharmacoeconomics in Yemen can maximise a number of health benefits yielded from its very little resources.

This study has revealed that only several pharmacoeconomic analysis studies have been conducted in Yemen. The two studies about TB in Yemen (Othman, Ibrahim, & Raja'a, 2012; Ramsay et al., 2010)focus on the direct cost and indirect cost for the patients as well as for the health services in cases of pulmonary and extra pulmonary TB and they found that the cost of extrapulmonary TB is higher not like the pulmonary TB especially for the patient, which shows that there were a delayed diagnosis and longer treatment time. Patients constitute the majority of the cost of diagnosis and treatment of pulmonary and extrapulmonary TB. The cost of anti-TB drugs made up the highest proportion of the costs to the public health services for both pulmonary and extrapulmonary TB.

The Oxfam-supported research project had produced a book entitled 'Cost Sharing for Primary Health Care: Lessons' from Yemen By Abdul W. Al Serouri, Dina Balabanova, Souad Al Hibshi. The study began in April 2000 in the context of health sector reform, and it studied the perceptions of users and providers of cost-sharing schemes in Yemen. Taking the findings of the research, the book seeks to demonstrate the consequence of cost sharing on the population of Yemen, and specifically on weaker people. The authors show that health care is for the larger populace, particularly in rural places. The goal is to open the eyes of the decision-makers to the features of cost-sharing policies that are likely to dampen equitable access to services and avert quality improvements and sustainability. The study threw the spotlight on the essential elements for an equitable health-financing policy in Yemen: affordable and locally available drugs and services, rational drug use, better staff training, and ongoing support and supervision by the agency responsible for it. The critical issues in this research will be very timely for the wider discussions of the planning and evaluation of health sector reform to be conducted (Al Serouri, Balabanova, & Al Hibshi, 2002).

This finding from Yemen is harmonious with other low-income countries, whereby several studies have demonstrated the scarcity of economic evaluation studies (Gavaza et al., 2010; Desai, Chandwani, & Rascati, 2012; Tran et al., 2014; Odame, 2013; Gavaza et al., 2008; Gavaza et al., 2012).The study has also disclosed the fact that there is an existing knowledge gap when it comes to the understanding of economic evaluation among decision makers. Pharmacoeconomic is therefore in its infancy in Yemen, which partly justifies the scant number of such studies (Mori, Gavaza, & Robberstad, 2013). Despite this insufficient number, it is encouraging to find that most of the works are relatively new and they address priority diseases in the country such as malaria and TB. This implies that there is a growing research interest in this substantial area.

The economic evaluation is a universally accepted action as a key decision-making tool for medicine selection committees at three levels- micro, meso and macro levels (Chen, Ashcroft, & Elliott, 2007; Eddama, & Coast, 2009;Eddama, & Coast, 2008; van Velden, Severens, & Novak, 2005; Simoens, 2010). However, this did not apply to Yemen. It had been found out that the majority of extant pharmacoeconomic studies were conducted long after formulary decisions had already been made. Decision-makers usually have to work very fast and they do not normally take a long time for economic evidence to present itself (Yothasamut, Tantivess, & Teerawattananon, 2009), especially when they do not comprehend or appraise such evidence. The lack of availability and inconsistent use of pharmacoeconomic analysis evidence implies the fact that it has a restricted role in informing resource allocation decisions between competing for drug therapies in Yemen. What is more important is the fact that this reminds us that health policy decisions are characteristically political in nature and hence may involve the issues of power, alongside social and economic sustainability (Walt, & Gilson, 1994; Borgonovi, & Compagni, 2013).

9. Why we need Pharmacoeconomics in Yemen?

- Pharmacoeconomics is a component within the broader health economics field that centers on the costs and benefits of pharmaceuticals.
- Pharmacoeconomic analysis helps the decision makers of healthcare institutions to make the best use of the limited resources in healthcare.
- Healthcare providers and administrators must equate the needs of individual patients with the larger societal needs, acknowledging the fact that limited resources cannot cater for all needs and wishes.
- Therefore, the pharmacoeconomic analysis is required to study both costs and benefits to make sure that the medical progress is going to be efficient and fruitful.

10. Importance of Teaching Pharmacoeconomics in Health and Academic Institutions in Yemen

Pharmacoeconomic education in the developed world is very well laid out and introduced into the university curricula of undergraduate and postgraduate programs. The number of US pharmacy colleges and

schools teaching pharmacoeconomics at the professional level had elevated from 80% in 1997 to 92% in 2007, and the colleges and schools that did not offer pharmacoeconomic courses had yet to look for instructors or only recently started the courses (Rascati, Conner, & Draugalis, 1998; Reddy et al., 2008). In the international landscape, the percentage of pharmacy colleges and schools which offer pharmacoeconomic education increased from 41% in 1997 to 52% in 2004 (Nwokeji, & Rascati, 2005; Rascati, Conner, & Draugalis, 1998). In this international survey, only one existing faculty for Pharmacy did not reply to it.

The current work also showed that only a few pharmacy faculties, out of the 19 in the country included the topic as a compulsory subject in their undergraduate program.

Pharmacoeconomic research and economic evaluation studies would be considered ideal in Yemen, given its current situation. However, as there seem to be zero alternatives in the present let alone in the future, the scarce resources will further hamper the performance of such an assessment in this country.

11. Conclusions:

Pharmacoeconomic research in Yemen will play an increasingly important role in making critical decisions surrounding the options that have to do with drug therapies and pharmaceutical services. Equally importantly, pharmacists and future pharmacists should have a foreground understanding of pharmacoeconomic concepts and the research methods employed to most effectively take advantage of the information obtained from this rapidly growing field. It has to be stated that Pharmacoeconomics in Yemen will be useful in multiple ways :

- It offers an economic evaluation of pharmaceuticals to help in the process of the decision making in the healthcare system.
- It helps strategies clinical drug studies.
- It decides on what would be a potential market for drugs in times ahead.

Conflicts of Interest:

Authors declared no conflicts of interest.

Corresponding Author:
Mohammed Alshakka, Ph.D. (U.S.M.)
Section of Clinical Pharmacy, Faculty of Pharmacy, Aden University, Aden, Yemen
E-mail: Alshakka400@gmail.com

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