

# Economic Evaluation of Public Healthcare Promotion Programs

Inayatullah\*, Ariba Khan\*\*, Fahmida Ghani \*\*\*, Dr Shafi Muhammad Wassan \*\*\*\*, Muhammad Ismail Sial\*\*\*\*, Dr Saqib Nabi\*\*\*\*\*

\* College of Nursing Sindh Government Hospital Liaquat Abad

\*\* Baqai University Department of Health and Management Sciences Karachi

\*\*\* Indus Hospital and Health Network

\*\*\*\*Department of Community Medicine SMBBMU Larkana & GMMMC Sukkur

\*\*\*\*\* Communicable Diseases Control HIV-AIDS Sindh

## Abstract-

The field of cost-effectiveness analysis (CEA) and economic evaluation (EE) of health care programmes is new, but Pakistan lacks the resources required to fully understand EE and CEA. With particular regard to Pakistan, the present study strives to fill this gap by offering a foundational work on the subject of economic evaluation. We reviewed the economic evaluation contents in the general health reading materials and books that were available locally using the four-dimensional criteria of availability, pertinent, complete, and accurate. Although undergraduate medical courses identify CEA as a fundamental ability and talent of physicians, we were unable to locate any mention of economic evaluation in the sources that were indicated. We discover that economic evaluation involves two requirements: the analysis must take into account both cost and effectiveness, and at least two medications or medical interventions need to be compared. In this paper, we provide an overview of EE/CEA and suggest that EE subjects be taught in Pakistani public health and medical courses.

**Keywords:** Cost effectiveness analysis, Economic Evaluation, Healthcare Economics and organization.

## I. INTRODUCTION

A popular approach to clinical decision-making and health policy support is economic evaluation (EE). According to Malik et al. (2017), EE is a legally mandated prerequisite in numerous developed countries for the approval of new medications and medical equipment. EE is a developing field in low- and middle-income countries (LMIC). Even though EE is a crucial part of the public health and medical curricula created by the Pakistani College of Physicians and Surgeon (CPSP) and the Pakistan Medical and Dental Council (PMDC), very few colleges and universities integrate EE content in their educational programmes (Gunawardane, 2019). In this area, there aren't many resources that can be accessed locally. Just a few textbooks on community medicine and public health address the topics of EE, and the information available is incomplete and inaccurate. The present research aims to close the knowledge gap on cost-effectiveness analysis among clinical and community health students. We looked over the EE resources that are readily available locally and

found any deficiencies. Here, we present the proper definition, range, and categories of EE along with samples from Pakistani and international published works in this domain.

## II. METHODS

We looked at the CPSP community health care curriculum, the PMDC medical curriculum, locally accessible textbooks, and reading materials on EE from the PMDC, CPSP, and some of the best medical colleges in Pakistan. For this study, a four-dimensional set of criteria was created:

- Is the material from EE accessible?
- Does the material on EE make sense in the surrounding area?
- Is the material offered sufficient to comprehend the EE concepts?
- Is the material on EE up to date?

When the words "economic evaluation or cost evaluation, cost-effectiveness analysis, and cost-benefit analysis" are absent from the book, the topic is flagged as missing. We classified a topic as "irrelevant" if it deviates from the intended Economic Evaluation (EE) and instead addresses other topics. We used the term "incomplete" to describe information from Economic Evaluations (EE) that was either missing or only partially addressed the subject. We designated a topic or piece of material on Economic Evaluation (EE) as "inaccurate" if it is deceptive. We looked through books and published works on the topic to discover relevant content for EE. The researcher examined five textbooks that are highly recommended by the PMDC, CPSP, and other prestigious medical schools in the nation for their content on economic evaluation (EE). Among these are Preventive and Social Medicine, Preventive Medicine Foundations, Community Medicine Foundations, Public Health and Community Medicine, and Public Health and Community Medicine Textbook (Juni et al., 2017). A comprehensive search of the available literature was done to locate published research on CEA in health care programmes in Pakistan. Using the phrases cost analysis, cost of services, cost-effectiveness

analysis, economic evaluation, cost utility analysis, and cost benefit analysis together with the keyword Pakistan, we conducted searches on the search engines Google Scholar and PubMed. We employed an open-searching approach, meaning that we did not impose any limitations on the year of publication, article genres, and the search strategy. The research included English-based articles.

### III. RESULTS

In the medical course of study of the PMDC, we discovered that using CEA for healthcare decisions is an essential trait and skill required for medical students. According to Nair et al. (2017), the foundation of a community-based medicine curriculum is the cost-effective and cost-benefit analysis for medical programmes and interventions, which is covered in a distinct part on healthcare funding and economics.

Our examination of healthcare and community medicine textbooks showed that they were completely lacking the crucial element of economic appraisal. For example, there is no discussion of economic evaluation in the textbook. The topic "Financial Cost and Cost Aspects of Primary Health Care (PHC)" addresses a few different aspects of "cost". According to Park's 2005 textbook, EE/CEA is a quantitative approach grounded in behavioral sciences. The book does contain certain details about economic evaluation; however, the material is either erroneous or irrelevant (such as input-output analysis). Although CEA as well as cost-utility analysis are more common in the field of healthcare economics than cost-benefit analysis (CBA), Park's 2005 textbook describes the technique of "cost-benefit analysis (CBA)" as a "greater attractive tool" than cost-effectiveness analysis (CEA). Sheikh (2009) provided a false overview of cost-effectiveness analysis (CEA) that omitted important details. Moreover, none of the previously mentioned texts illustrates the intersection of healthcare economics and economic evaluation within the Pakistani setting. Twelve peer-reviewed papers about EE/CEA from Pakistan were found through a literature search. Of them, three discussed cost-effectiveness analysis, five discussed the cost of different services, two discussed the quality of life in Pakistan for patients suffering from liver disease and high blood pressure, and one discussed the costs associated with the family planning programme in Pakistan (Karekar & Shetty, 2021).

Three of the books are identified as worldwide recommended publications on EE/CEA. These include Economic evaluation in healthcare: integrating theory and practice, Cost-effectiveness of health and medicine, and Techniques for the Economic Evaluation of Healthcare Programmes. Additionally, the website of the International Society for Pharmaceutical Economics and Outcome Research (ISPOR) provides online information on cost-effectiveness analysis in the field of health care (Sharma et al., 2024). In the section that follows, we describe the nature, extent, and varieties of economic evaluation employed in the healthcare industry based on the assessment of these materials.

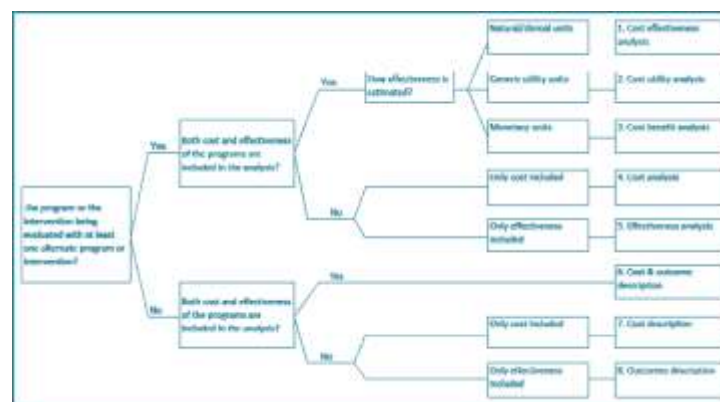
#### Cost Effectiveness Analysis

The goal of EE is to select the most effective programme out of all the possibilities available, taking into account each option's cost and efficacy. Therefore, EE/CEA is a relevant word that involves two requirements: first, the assessment must take into account both cost

and effectiveness; secondly, a programme, medication, or medical procedure must be compared with a minimum of a single option (Hoque et al., 2011). For instance, we cannot assess the cost-effectiveness of a poliomyelitis vaccination unless we have evaluated both its efficacy and cost, as well as contrasting it with those of a substitute programme, such as a rehab programme for individuals with disabilities connected to polio. "Economic evaluation" is an appropriate name, and one of its different kinds is CEA. Cost analysis, cost-utility analysis, and cost-benefit analysis (CBA) are other forms of economic evaluation. We created a chart using the two previously mentioned rules to categorize different forms of economic study. Research that compares options and accounts for both costs and results Comprehensive economic evaluations fall within the category shown in Boxes 1-3 in Figure below.

#### Difference Between Cost and Expenditure

Making the distinction between cost and expenditure is a crucial first step in EE. Cost is the monetary equivalent of the actual usage of resources on a project or intervention. Contrarily, expenditure is the amount of money used for a project or programme. For instance, a report by van Velden et al. (2005) details the cost to the Ministry of Population Welfare (MoPW) from 2005 to 2006 of \$ 77 per woman serviced and USD per couple of years protected (CYP). Actually, they have calculated the costs per CYP and women serviced. First of all, their calculations include the money that MoPW spent on capital items like buildings, machinery, cars, and even training for staff which might have been used even after the years 2005 to 2006. On the whole, all capital expenses have to be adjusted and then factored into cost projections. Furthermore, the cost of MoPW's services delivery role might not include expenses connected to administration and stewardship.



#### Economic Evaluation of Health Programs

The cost per out-patient admission to a Primary Healthcare unit in Pakistan, according to a research report on the expense of primary medical care, was PKR 295 for each treatment included in the cost-benefit analysis. According to Husereau et al. (2022), it is irrelevant when making health-related choices. With the use of a case study 1.25 from the year 2005–2006, we clarify the cost description. A single patient treated at BHU for a common sickness costs 4.1 US Dollars, which is far cheaper than the USD 77 that one woman receives in a federal family planning unit (Ramponi et al., 2021). However, this comparison is deceptive and might depict the Ministry of Population Planning's work as ineffective. Given that the former is an expense and the earlier is an actual expense. The simplest way

to characterize additional research that uses costing from Pakistan is as the cost of disease or expense of service investigations (Box 7 in the Figure).

### ***Cost-Effectiveness Analysis Types***

There are four categories of economic appraisal. The other three methods are regarded as comprehensive economic appraisals, with the exception of cost analysis. The different forms of economic evaluation are described in the paragraphs that follow.

### ***Cost Description/Analysis***

Comparing the expenses of more than one programmes is known as cost analysis (Box 4 in the Figure). This comparison either disregards efficacy or assumes that all of the treatments that are part of the analysis are equally successful. Makhani et al. (2020) discussed about how irrelevant it is when making medical decisions. We use case study 1 to illustrate cost description.

### ***Case Study 1: What is the type of the following EA - Economic Evaluation?***

A report on the Montreal Thalassemia Disease Prevention Program's financial matters was presented by Subías-Perié et al. (2022). They contrasted the expenses of thalassemia therapy, including diagnosis, spleen removal transfusion therapy, and detoxification therapy, with that of prevention, which includes carrier testing and prenatal testing. They came to the conclusion that thalassemia control is 3.5 times less expensive than thalassemia therapy. Despite the title of the paper indicating otherwise, it is a cost study involving two programmes, represented by Box 4 in the Figure.

### ***Cost Effectiveness Analysis (CEA)***

An analysis known as "cost-effectiveness analysis" compares expenditures to standard units of measurement, such as "dropped blood pressure," "the capacity to properly identify symptoms," "free of symptoms days," or various useful and psychological ability scales (Box 1 in the Figure). This method of measuring effectiveness restricts the ability to compare interventions across different clinical domains. We provide an explanation of this using case study 2 (Ha et al., 2022).

### ***Case Study 2: Is community-based tuberculosis treatment more cost-effective than hypertensive care?***

Cost-effective hypertension care in a Pakistani community was presented by Cleary (2020). For every 1 mmHg decline in systolic blood pressure, they provided a cost. According to the authors, the combination of a skilled general practitioner and home health education is more economical than the remaining trial strategies.

Drummond et al. (2015) presented the Directly Absorbed Treatment Strategy (DOTS) as an economical way of managing tuberculosis (TB). The results indicated that treating tuberculosis with a community health professional present while the patient receives therapy was a more economical approach than using other methods.

In response, it is not possible to compare interventions with distinct sets of objectives and results. Costs for tuberculosis case management with DOTS and health professionals in the community, for instance, cannot be compared with costs per mmHg decrease in diastolic blood pressure.

When a programme or intervention has several outcomes, this presents another barrier for CEA. When comparing the cost-effectiveness of at-home palliative therapy to care-as-usual, for example, there are several benefits that can be understood including reduced pain, improved mobility, a more comfortable dying procedure, etc.

### ***Cost Utility Analysis (CUA)***

A form of economic evaluation known as cost-utility analysis measures the result in terms of longevity and standard of life (see Box 2 in the Figure). A healthcare program's added life years are combined with an assessment of the value of those extra years to arrive at CUA. Utility refers to this feature of assessment. This utility-based approach can be employed to contrast quite varied health plans in the same terms and is not limited to comparable therapeutic fields (Rice et al., 2022). It is feasible, for instance, to compare the standard of life scores for Hcv B18 and high blood pressure, which would not be possible otherwise. The results of a cost-utility analysis are assessed based on how important they are. A general outcome metric called Quality Adjusted Life Years (QALY) integrates life expectancy and quality into a single numerical product. Health policymakers frequently employ cost utility analysis with QALYs as a final measure because it has the capacity to address resource allocation issues within a given budget. We define the differences between CEA and CUA in case study 3 (Obreli-Neto et al., 2015).

### ***Case Study 3: Which kind of economic evaluation is this?***

The expenditures of four screening methods—red blood cell index determination, the use of a computational model based on RBC parameters, dichloro-phenol-endo-phenol (DCIP) test, and haemoglobin electrophoresis—were compared in a study conducted by Wiwanitkit (2006) to determine the most cost-effective way to screen for haemoglobin E in expecting Thai women. The cost of every test was assessed by the researchers, who then compared it to the value of each test in terms of how well it could identify pregnant women who had anemia abnormalities. The answer is that this kind of study is better categorized as cost-effectiveness analysis than cost-utility evaluation because the test's sensitivity determines its capacity to diagnose conditions accurately rather than the benefit it provides. Syed et al. (2013) gave a CUA a suitable approach to measure the quality and longevity of life in their analysis, one that is consistent across interventions. When compared to alternative interventions at the GBP 30000/quality of life years limit, they found that the CBAG is more affordable at GBP 22000 / QALY (Malik et al., 2017).

### ***Cost benefits analysis (CBA)***

Compared to other methods of economic assessment, cost-benefit analysis is thought to be the most accurate and conceptually valid. In order to determine if a certain programme is worthwhile choosing on its own, CBA attempts to assign an economic value to both the inputs (expenses) and the results (benefits) of health care. This is done by defining the program's overall benefits as exceeding its entire costs (Box 3 in the Figure).

CBA's ability to translate benefits into financial terms makes it possible to compare projects across healthcare domains, including those outside of medicine. However significant advantages that are hard to quantify, like anxiety alleviation, can be overlooked in the analysis. A contemporary approach to outcome monetary valuation involves assigning an economic value to each quality-adjusted life year. The standard threshold value for one QALY in the UK is thirty thousand British pounds. A therapy typically qualifies for the National Health Service financing if its cost / QALY is less than BP 30000. This threshold is set at fifty thousand dollars per QALY in the United States of America (USA). According to Malik et al. (2017), the World Health Organization suggests using a country's GDP (per capita) three times as a benchmark for each Disability Adjusted Life Year (DALY).

### Incremental Analysis

A particular aspect of EE that is relevant to health policy is the incremental cost-effectiveness ratio (ICER).  $ICER = (C1 - C2) / (E1 - E2)$  is the ratio, expressed mathematically, of the differences in the total expenses of two programmes divided by the differences in their efficacy.

The cost of programmes 1 and 2 is represented by C1 and C2 in the formula provided above, while the efficacy of programmes 1 and 2 is represented by E1 and E2, correspondingly. A policymaker faced with the more urgent decision of "how much does it cost incrementally to move from the present programme to the cost-effective programme" is informed by the incremental analysis. A case study explains how to analyze ICERs (Malik et al., 2017).

### Case Study 4: Analyzing incremental cost-effectiveness ratios

In the context of managing hypertension, household health education (HHE) combined with general practitioner (GP) training is more cost-effective than the control arm (care as usual), with an ICER of 23 United States Dollars for every 1 mmHg decrease in systolic blood pressure (Malik et al., 2017). This is the policy analysis of the ICER as stated by Jafer and Islam (2011).

The cost to society of every additional one-millimeter drop in systolic blood pressure is twenty-three dollars if a healthcare policy maker decides to replace the standard therapy of hypertension at the level of primary healthcare with HHE + GP.

### Limitations

Economic evaluation lacks the freedom to use clinical trial data for medical decision-making across national borders. This implies that a measure that proves to be more economical in one nation than another may not always be so in other nations. A notable example to bring up in this context is the comparison of the cost-effectiveness of percutaneous coronary intervention (PCI) with coronary artery bypass grafting (CABG). Summary results from Stroupe and Hatcher et al. (2014) show that, for US patient populations, PCI is more cost-effective than CABG. But according to research by Malik et al. (2015), in UK settings, CABG is more affordable than PCI. In addition to the numerous variations in the approaches, patient populations, and results used in the two publications, the contradicting results point to a significant EE constraint.

## IV. CONCLUSION

Our discussion of the scope and varieties of cost effectiveness analysis was central to the description of the economic evaluation of health care programmes. We proved that the sources which are available locally include errors and insufficient information. Additionally, we proved that peer-reviewed scientific literature contains similar uncertainties and inadequacy. Among the first steps towards increasing EE awareness in Pakistan is this article. Nonetheless, we urge more methodical measures to guarantee that EE subjects are covered and appropriately taught in the nation's public health and medical educational institutions.

## REFERENCES

- Cleary, S. (2020). Economic evaluation and health systems strengthening: a review of the literature. *Health Policy and Planning*, 35(10), 1413-1423.
- Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L., & Torrance, G. W. (2015). *Methods for the economic evaluation of health care programmes*. Oxford university press.
- Gunawardane, D. A. (2019). Type of economic evaluations. *J Coll Community Physicians Sri Lanka*.
- Ha, N. T., Huong, N. T., Anh, V. N., & Anh, N. Q. (2022). Modelling in economic evaluation of mental health prevention: current status and quality of studies. *BMC health services research*, 22(1), 906.
- Hatcher, P., Shaikh, S., Fazli, H., Zaidi, S. and Riaz, A., 2014. Provider cost analysis supports results-based contracting out of maternal and newborn health services: an evidence-based policy perspective. *BMC health services research*, 14, pp.1-8.
- Hoque, M. E., Khan, J. A., Hossain, S. S., Gazi, R., Rashid, H. A., Koehlmoos, T. P., & Walker, D. G. (2011). A systematic review of economic evaluations of health and health-related interventions in Bangladesh. *Cost Effectiveness and Resource Allocation*, 9, 1-8.
- Husereau, D., Drummond, M., Augustovski, F., de Bekker-Grob, E., Briggs, A. H., Carswell, C., ... & Staniszewska, S. (2022). Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. *MDM Policy & Practice*, 7(1), 23814683211061097.
- Juni, M. H., Rosliza, A. M., & Faisal, I. (2017). Designing and conducting cost-effectiveness analysis studies in healthcare. *International Journal of Public Health and Clinical Sciences*, 4(5), 62-76.
- Karekar, S., & Shetty, Y. (2021). Assessment of the quality and trend of reporting of health economic evaluation research in India. *Expert Review of Pharmacoeconomics & Outcomes Research*, 21(4), 595-599.
- Makhani, L.A., Moran, V., Sadique, Z., Singh, N.S., Revill, P. and Roberts, B., 2020. Examining the use of economic evaluations in health-related humanitarian programmes in low-and middle-income countries: a systematic review. *Health Policy and Planning*, 35(2), pp.210-218.
- Malik, M. A., Iqbal, S. P., & Abrejo, F. (2017). Nature, scope and use of economic evaluation of healthcare programmes: with special reference to Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, 67(5), 773.
- Malik, M.A., Gul, W. and Abrejo, F., 2015. Cost of primary health care in Pakistan. *J Ayub Med Coll Abbottabad*, 27(1), p.88.
- Nair, K. S., Jehan, M., Albejaidi, F., & Pasha, S. A. (2017). Cost-effectiveness analysis for decision making in health care-concept, relevance and methodological challenges. *International Journal Of Community Medicine And Public Health*, 4(7), 2212.
- Naveed, T., Bhatti, N. M., & Shahid, A. (2017). Perception Regarding Learning and Social Self of First Year MBBS Students in an Educational Environment. *Isra Medical Journal*, 9(5).
- Obreli-Neto, P. R., Marusic, S., Guidoni, C. M., Baldoni, A. D. O., Renovato, R. D., Pilger, D., ... & Pereira, L. R. L. (2015). Economic evaluation of a pharmaceutical care program for elderly diabetic and hypertensive patients in primary health

- care: a 36-month randomized controlled clinical trial. *Journal of managed care & specialty pharmacy*, 21(1), 66-75.
- Park, K., 2005. Park's textbook of preventive and social medicine. *Preventive Medicine in Obstet, Paediatrics and Geriatrics*.
- Ramponi, F., Tafesse, W. and Griffin, S., 2021. Economic evaluation of interventions to address undernutrition: a systematic review. *Health policy and planning*, 36(4), pp.533-541.
- Rice, S., Carr, K., Sobiesuo, P., Shabaninejad, H., Orozco-Leal, G., Kontogiannis, V., ... & Cassini, A. (2023). Economic evaluations of interventions to prevent and control health-care-associated infections: a systematic review. *The Lancet Infectious Diseases*, 23(7), e228-e239.
- Sharma, D., Aggarwal, A. K., Bahuguna, P., & Prinja, S. (2024). The Impact of Alternate Methodological and Structural Assumptions on Results of Cost-effectiveness Analysis: Empirical Evidence using Three Indian Economic Evaluations. *Indian Journal of Public Health*, 68(1), 9-14.
- Subías-Perié, J., Navarrete-Villanueva, D., Gómez-Cabello, A., Vicente-Rodríguez, G., & Casajús, J. A. (2022). Health economic evaluation of exercise interventions in people over 60 years old: A systematic review. *Experimental Gerontology*, 161, 111713.
- Syed, H. B. K. M. T., & Shaikh, M. M. M. A. (2013). Morbidity Pattern and Health Education for School age Children in Karachi. In *Medical Forum Monthly* (Vol. 24, No. 3).
- van Velden, M. E., Severens, J. L., & Novak, A. (2005). Economic evaluations of healthcare programmes and decision making: the influence of economic evaluations on different healthcare decision-making levels. *Pharmacoeconomics*, 23, 1075-1082.
- Wiwanitkit, V., 2006. A cost utility analysis of the right method for screening hemoglobin E among Thai pregnant women. *Archives of Gynecology and Obstetrics*, 274, pp.88-90..

## Authors

### First Author – Inayatullah

Clinical instructor,  
College of Nursing Sindh Government Hospital Liaquat Abad

### Second Author – Ariba khan

Lecturer Baqai University Department of Health and Management Sciences Karachi

### Third Author – Fahmida Ghani

Senior Head Nurse  
Indus Hospital and Health Network

### Fourth Author – Dr Shafi Muhammad Wassan

Associate Professor  
Chairperson  
Department of Community Medicine SMBBMU Larkana & GMMMC Sukkur

### Fifth Author – Muhammad Ismail Sial.

Staff Nurse SMBBMU Larkana

### Sixth Author – Dr Saqib Nabi

Project Support Officer  
Communicable Diseases Control HIV-AIDS Sindh

### Correspondence Author - Inayatullah

Clinical instructor,  
College of Nursing Sindh Government Hospital Liaquat Abad