



Introducing Economic Evaluation as a Decision Support Tool in Health Care: A Case Review of IR Iran

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ABSTRACT

Background: Health care is a dominant economic and political issue in many economically developing and even developed nations. Most of these nations have experienced rapid increases in their healthcare spending over recent years.

Objectives: This challenge creates a continuing quest for reaching better health system efficiency, equity as well as quality and safety.

Materials and Methods: Economic analytic methods have been created to inform decision-makers where the appropriate allocation of scarce resources is significantly more needed. However, through a non-systematic (narrative) review it was found that Iranian decision- or policy-makers may not be well informed and equipped to make complex policy decisions about funding and delivery of health care in order to meet financing needs.

Results: It is likely that, to date, little attention has been paid to developing a better conceptual understanding of economic evaluations in decision-making environments at the local level or across the whole healthcare system.

Conclusions: This study aims to shed light on different methods of economic evaluations in order to provoke healthcare professionals and researchers to think about different ways in which economic evaluations might be of value to their practices.

► Implication for health policy/practice/research/medical education:

The paper shows different methods of economic evaluations in order to stimulate healthcare professionals and researchers to think about ways in which economic evaluations might be of value to their practice. This should be of interest to a broad readership including those interested in public health policy, healthcare delivery and funding, economic evaluation, resource allocation and decision-making.

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1. Background

Islamic Republic of Iran (I.R.I), with a population of over 74 million, does not have a high-quality healthcare system in the WHO Eastern Mediterranean Region (EMR), which is reflected in part in the level of its population health. Its ranking for many aspects of health status falls behind other 22 Middle East countries. For example, it has the eighth lowest life expectancy (72.1 years), and a fairly high Infant

Mortality Rate (18 deaths per 1000 births) in the region as of 2010 (*Table 1*). However, in general the Iran's health outcomes continue to improve. While this improvement cannot be entirely due to the healthcare system, it plays an important part in this achievement. Total health expenditure, as a proportion of GDP, accounted for 5.5%, slightly lower than the average of 5.6% in EMR countries in 2010. In terms of annual total health expenditure per capita, Iran ranks

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Table 1. Selected Healthcare Status and Expenditure in Eastern Mediterranean Countries in 2010

	Population (in Thou- sands)	Life Expec- tancy (Both Genders)	Infant Mortality Rate	GDP per Capita	Total Expendi- ture on Health (as % of GDP)	General Government Expen- diture on Health (As % of Total Health Expenditure)	Per Capita Total Expenditure on Health	Out-of-Pocket Expen- diture as % of Total Health Expenditure
Afghanistan	26000	46.0	111.0	692	7.4	21.5	51	77.7
Bahrain	1235	74.8	7.2	24409	4.5	68.7	1108	18.1
Djibouti	818	53.9	67.0	1214	7.0	76.9	84	22.8
Egypt	78728	73.2	16.5	2257	5.0	41.7	113	57.0
Iran (I. R.)	74733	72.1	18	4869	5.5	39.0	269	58.9
Iraq	32326	71.0	24	2499	3.9	72.2	98	27.8
Jordan	6113	73.0	23	3627	9.3	64.6	336	29.5
Kuwait	3566	77.7	10.7	42805	3.3	83.9	1416	14.7
Lebanon	4189	81.5	16.1	8157	8.1	49.2	663	40.5
Libya	5603	72.3	14.0	10722	3.9	66.1	417	33.9
Morocco	31851	74.8	30.2	2830	5.5	34.4	156	56.6
Oman	3174	72.6	9.6	16470	3.0	78.8	497	13.5
Pakistan	173510	64.5	65.5	862	2.6	32.8	23	56.8
Palestine	4048	72.2	14.0	1697	15.6	36.8	248	36.7
Qatar	1714	78.2	6.8	69754	2.5	79.3	1715	16.2
Saudi Arabia	27137	73.5	17.3	14550	4.9	67.0	714	17.1
Somalia	8698	50.0	109.0	NA ^a	NA	NA	NA	NA
Sudan	41476	57.1	81.0	1293	7.3	27.4	95	69.8
Syrian Arab Republic	20619	73.1	17.9	2462	3.6	48.5	88	52.0
Tunisia	10549	74.5	17.8	3852	6.2	54.0	240	40.0
United Arab Emirates	4765	77.4	7.6	54138	2.8	69.3	1520	20.3
Yemen	22879	61.1	68.5	1137	5.6	28.0	64	71.0
Total/Regional Average	583731	69.3	34.2	12871	5.6	54.3	472	39.6

^a Not Available.

Source: WHO Regional Office for the Eastern Mediterranean

below the EMR average (\$269 US vs. \$472 US). Almost 39% of total health expenditure has been provided through public funding sources in 2010, below the average of 54.3% in EMR countries. Out-of-pocket expenditure as a proportion of total health expenditure accounted for 58.9% in Iran, far above the regional average (39.6%) (1) (Table 1).

Nevertheless, Iran faces a series of significant challenges. First, the growing burden of chronic diseases associated with population ageing. Second, there are challenges of patient safety and medical errors, the uptake of advanced and technologically diagnostic and therapeutic procedures, demand pressures, and workforce shortages (2). Third, there is a political controversy about public-private mix in the funding and delivery healthcare. Fourth, there is inequality in healthcare providing between advantaged and disadvantaged Iranians (3), where around 28% of the population lives outside cities in large unpopulated regions and small scattered settlements with limited access to healthcare services (1). Fifth, total spending on health care continues to rise faster than both inflation and population growth. Simultaneously, out-of-pocket spending on health care is growing fast, and is higher relative to many similar EMR countries, where it has grown from 50.7 in 2008 to 58.9% in 2010 and currently, which currently raises a serious concern to access needed healthcare services. Sixth, considerable disparities remain over 10-40% of the population – depending upon the source and study – who are not covered by any insurance scheme and have to pay directly. Even those under a social/public insurance coverage are somehow forced to pay some gap while referring to private sectors because of low tariff rates (4, 5). In addition, not all kinds of services, in particular medical services which are not considered essential for good health such as some optic procedure, attract social security or similar insurance benefits (4).

Seventh, resources are usually allocated retrospectively ignoring future risks and crises; and choices have to be made among competing alternatives due to relative scarcity of resources specifically during times when scarcity of healthcare resources increases (6); Moreover improvements in gathering comprehensive national data about medical errors towards a better quality and safety in health care have remained anecdotal (7); the health system is not economically sustainable as funding methods do not reward efficiency. Altogether these challenges and similar problems are inexorably raising concerns about increased demands for healthcare services, rising expenditure and some complexity due to aforementioned issues, have already restricted financial, physical and human resources necessary to improve Iranian's health. Nationwide cooperation and leadership among healthcare professionals is also required to secure and improve Iran's future health issue. However, considering the current healthcare infrastructure, little flexibility

exists to achieve this in a system hamstrung by a focus on historical funding, fee-for-service payment methods and isolated episodes of acute healthcare services, growing out-of-pocket expenses, workforce deficiencies and inadequate insurance coverage. The challenges will create a continuing quest for attaining a better healthcare system efficiency, equity and quality and safety in the context of competing organization mission, vision and goals, manifold stakeholder interests, inconsistent values and scarce resources. In spite of scarcity of resources, the Iranian healthcare system can meet these challenges if policy-makers recognize the economic, ethical, political and social elements (e.g. quality and safety, equity, effectiveness, efficiency, accountability and public values and preferences) within a broader context of policy formulations.

For many research workers, when resource scarcity exists, a new thinking mode is required to prevent maldistribution of resources. 'In a system with limited resources, health professionals have a duty to establish not only that they are doing good, but they are doing more good than anything else that could be done with the same resources' (Williams, 1993 cited in Phillips, 2005) (8). Economic evaluation has the potential to offer a mode of thinking that can maximize healthcare benefits for society within the available resources in a period of time. Through economic thinking policy-makers can systematically analyze health expenditure impacts of environmental change and the consequences (benefits) of improving patterns of resources allocation (9-11). Despite a large body of international literature concerning the use of economic evaluation in the resource allocation decision-making (12-17), very few examples of formal economic evaluations exist at the local or central levels of healthcare administration in Iran (18-22).

2. Objectives

What remains unclear is that why the potential benefits of economic evaluations are not being fully utilized in this country? The study of health economic evaluation is important and invites us to reconsider both theory and practice. Healthcare professionals will need to understand its fundamental aspects and the way it affects (clinical) decision-making. This study set out to shed light on different methods of economic evaluations in order to instigate healthcare professionals and researchers to think about different ways in which economic evaluations might be of value to their practices.

3. Materials and Methods

A non-systematic literature review was undertaken in a narrative manner to provide information on the use of economic evaluation for policy decision-making in I.R. Iran. The relevant publications were selected and syn-

thesized according to the authors' personal and professional perspectives. Pubmed, Web of Science, Scopus and the Cochrane data sources were searched without any date limit up to June 2012. Additional records were gathered through manual searches of relevant studies using Google search engine. The search was limited to English, peer-reviewed articles on economic analytic methods in health care. Keywords included: cost, cost-benefit, cost-effectiveness, cost-minimization/minimisation, cost-consequence, cost-efficiency, cost-utility, and cost-of- illness, health (care), Iran and economic evaluation/appraisal/assessment. Multiple keyword sets were applied to maximize results from the searches. Duplicate articles were excluded.

4. Results

Early findings of this study showed that many decisions (mainly concerning medical technologies, and pharmaceutical pricing and reimbursement regulations) are made without taking formal economic evaluations into account in Iran. In this review, a total of 24 studies were found to be about budgetary impact (how much will it cost?) and cost measurements; however, no one was related to the use of economic evaluation methods in policy decision-making. Moreover, no instances of formal economic evaluations were found at the local level of healthcare management. Why the potential benefits of economic evaluations are not being fully utilized in Iranian healthcare contexts? In this review, an important general assumption stood out which has been a basis for writing this paper: systematic evidence-based reviews including formal economic evaluations are not widely used in any Iranian decision context, it is greatly due to the fact that many decision-makers possess limited knowledge of economic concepts. This issue leads to a kind of unfamiliarity with formal and partial economic evaluations, which have not been adequately reflected in current evidence-based reviews in Iran. Familiarity with a particular issue is largely correlated with availability of relevant information, expert consultants, prior work experiences and educational background.

4.1. Health Economic Evaluation

Despite financial constraints, allocation decisions have to be made on optimal distribution of resources among healthcare services (17). The availability of resources, however, is always insufficient to meet all the claims (wants and needs) and demands which healthcare systems face (23). It is the policy-makers' responsibility to balance the allocation of resources among many different healthcare services, particularly when the healthcare industry is challenged in resourcing and delivery of healthcare systems. Economic evaluations are invoked to help resolve the dilemma. They have been created to inform decision-

makers where the appropriate allocation of scarce resources is significantly needed (24).

The primary purpose of economics is to offer an analytic framework which helps to compare both the costs and consequences/benefits (and the attached values) of alternative 'courses of action' (healthcare programs or interventions) to facilitate the inevitable difficult choices (12). Health economic evaluation is thus 'the comparative analysis of alternative courses of action in terms of both their costs and consequences'(12). *Table 2* details several forms of full economic evaluation including Cost-Effectiveness Analysis (CEA), Cost-Benefit Analysis (CBA) and Cost-Utility Analysis (CUA) while partial economic evaluation lacks one or more characteristics of economic analysis, as explained in the table below (12, 25). Unlike Drummond *et al.*(12), Evers *et al.*, (26) have introduced Cost-Minimisation Analysis (CMA) as the fourth form of full economic evaluation.

4.2. Cost-Minimisation Analysis

In a cost-minimisation analysis, the consequences of two or more interventions being compared are equivalent or at least very similar. The analysis does not require any estimation of the benefits and just stresses on cost alone; the cheapest option is then selected. It is limited to comparing interventions with very similar outcomes, while outcomes of alternative methods for example for delivery are seldom exactly the same, so it cannot be employed to interventions with diverse outcomes. An example of this type of analysis would be the comparison of two antibiotics which have the same treatment benefits and side effects (12, 25, 27).

4.3 Cost-Effectiveness Analysis

In a cost-effectiveness analysis the costs and the consequences of a health program or intervention are sequentially measured in monetary terms and natural units (for example, kilograms of weight lost, number of patients immunized, reduction in blood pressure, life years saved) (12, 27). This analysis focuses on measuring the costs of an intervention aimed at reducing the burden of a disease and the health gains attributable to the intervention, for example, cost per positive cancer detected (28). If two treatments of A and B are compared together, and costs are lower and outcomes better (higher effectiveness) for A, then treatment A is said to dominate B.

Nevertheless, the cost-effectiveness analysis cannot compare interventions that have different outcomes and nor it can encompass quality of life or facilitate technical efficiency (29, 30). Maiwenn (2004) argued that outcomes in terms of cost-effectiveness ratio may not capture all relevant information in a way that policy-makers can depend on. For this reason, in recent years there has been a tendency to prioritize cost-utility analysis over

Table 2. Types of Economic Evaluation Studies and Their Valuation of Costs and Consequences (Outcomes)

	Measurement and Valuation of Costs in Both Alternatives, Dollars	Identification of Outcomes	Measurement and Valuation of Outcomes	Summary Measure
Cost-Minimisation Analysis^a In a CMA, the consequences of two or more interventions being compared are equivalent. The analysis therefore focuses on costs alone, and the cheapest option is chosen.	Monetary Units	None	None; only inputs are compared; outputs are assumed to be equal, which is rarely so	Dollars (difference in cost between alternatives)
Cost-Effectiveness Analysis An economic analysis to compare interventions that have a common health outcome; it attempts to measure a clinical output, such as reduction in blood pressure, or quality of life.	Monetary Units	Single effect of interest (measure), common to both alternatives, but achieved to different degrees	natural effects, physical units or clinical outcome (e.g. life years gained, reduction in blood pressure, cases of ventilator-acquired pneumonia avoided)	Cost-effectiveness ratio (eg, dollars per life year gained)
Cost-Utility Analysis Often interventions impact both on quality and quantity of life. A CUA can be used where outcomes are valued on individual preferences (QALYs Gained).	Monetary Units	Single or multiple effects, not necessarily common to both alternatives	Health state values what is so called health years (e.g. healthy years or quality adjusted life-years gained)	Cost-utility ratio (eg, cost per QALY)
Cost-benefit analysis In a CBA, attempts are made to value all the costs and consequences of an intervention in monetary terms. If the benefits are less than the costs then the intervention is acceptable.	Monetary Units (Dollars)	Single or multiple effects, not necessarily common to both alternatives	Monetary Units (Dollars)	Net gain or loss in dollars
Cost-consequence analysis^a An economic analysis where costs and outcomes are presented in a disaggregated form rather than a single measure.	Monetary Units	Multiple outcomes presented in a disaggregated form	Description	

^aIt is argued that cost-consequences and minimisation analyses may not be formal methods of economic analysis Source: (Drummond et al., 2005; Evers et al., 1998; Kernick, 2003) (12, 25, 26)

cost-effectiveness analysis, using health gain as the effectiveness criterion for all interventions. (31).

4.4. Cost-Utility Analysis

Cost-utility analysis aims to evaluate the quality of health outcomes produced or forgone by health interventions. In other words, in a cost-utility analysis the effects are expressed as measurements that reflect the value of lost years due to illness (12, 32). It assumes that life years must be treated as having different values when the quality of life differs (27). The most frequently used measure in cost-utility analysis is the quality adjusted life year (QALY), where benefits are determined based on impact on length and quality of life to generate an overall index for health gain (25). Although cost-utility analysis explicitly takes into account the quality of life, as well as the quantity of life, when measuring the benefits of a program, many commentators argue that the cost-utility approach should be treated with caution due to criticisms of QALYs (31, 33). For example, it is argued that QALYs discriminate the elderly disabled who have less opportunity of benefiting from an intervention than those who are younger (33). This approach inevitably leads to the conclusion that a disabled life has less value than a life without disability.

4.5. Cost-Benefit Analysis

In contrast to cost-effectiveness analysis, in which health outcomes are measured in physical units and neutral effects, in cost-benefit analysis a monetary value is presumed for the costs and consequences of health interventions, in other words, outcomes are valued in dollars (28, 33). This allows the measurement of costs and benefits in the same currency and thus can be applied to show whether the benefits of an intervention exceed the cost or not (28). If the benefits are greater than the costs, then the intervention is acceptable. Although this approach has the advantage of estimating net benefits and costs of a program or intervention to society, using the same monetary index, the data requirements is often large and methodological concerns around the estimation of non-monetary benefits, such as lives saved, makes this analysis problematic (34, 35). It means it is difficult to assign a dollar value to human life (36). Due to these methodological issues, cost-benefit analysis is not widely used, although a comeback seems to be occurring (33).

4.6. Cost-Consequence Analysis

In cost-consequence analysis costs and outcomes are presented in a disaggregated form, which avoid the need to represent results and costs as a single index. If two interventions yield same outcomes, the least costly method is the best. However, if the more expensive method yields better outcomes, cost-consequences analysis doesn't pro-

vide any guidance for adoption. This analysis may be a more attractive choice for decision-makers who can apply their own measures to different outcomes, though it is not a formal method of economic evaluation (25).

All types of economic evaluations have raised several concerns which include the assumption of a constant discount rate during time, the uncertainties in the valuation of human life and health, and the assumption of linearity in a number of important causal relationships (28, 34).

4.7. Application of Cost-of-Illness Studies in Health Care

Cost-of-Illness (CoI) or burden of disease is the economic burden imposed on individuals, communities and societies caused by a disease (28). Several countries have applied these economic calculations to better inform health policy (8, 37, 38). In Iran, for example, research workers have conducted a series of studies in this field (39). Nonetheless, a number of economists have criticized CoI studies as 'not worth doing and of low or zero value for priority setting (32, 40). Mooney, for instance, reasoned that setting priorities based on cost of illness would not bring about an efficient allocation of resources. Similarly, some argued that the measurement of indirect costs is not easy and to calculate intangible costs in monetary terms is even more difficult because there is no market price for such issues as well (41, 42). Jefferson, Demicheli and Mugford (43) were also critical of burden of illness studies because believe that they do not compare alternative uses of resources and consequently may not adequately determine opportunity cost. Kernick (32) argued that identifying and allocating appropriate costs becomes difficult where patients have coexisting diseases.

Policy-makers should not be misled into thinking that CoI studies provide comprehensive evidence in identifying whether more or fewer resources should be allocated to a given disease or service. Mooney (40), for instance, recognises that it cannot be applied as an alternative to economic appraisal. The estimation of a CoI for a disease relies on the aggregation of average costs; ignoring the utility and outcomes gained by reducing the illness. Consistent with these, Davey and Leeder (44) emphasized that 'to know the cost of illness is to know nothing of real importance in deciding what we should do about the illness. This depends on whether money can buy a solution or relief from the problem. A high CoI does not automatically indicate that additional resources should be devoted to the treatment of a particular condition, nor the reverse (45). These issues require attention while considering the costs and effectiveness of interventions for the disease in question, using what is called economic appraisal.

4.8. Applying Health Economic Evaluations in Policy

and Allocation Decisions

Health economics offers a rational basis for making allocation decisions, but it comes true if policy-makers accept that prioritization of decisions are important. By providing an agenda within which costs and consequences of a health intervention can be evaluated, economic appraisal has the potential to be of benefit and value in setting priorities and making decisions (11). Despite this prospective value and methodological developments in recent years, studies into the role of health economics information in decision-making process have shown poor application of the aforementioned procedures (13, 14, 17, 24, 46). Fattore and Torbica (47) argued that a large body of empirical literature contrasts with the paucity of their application in decision-making processes (48) even though, few studies available have shown that their influence on allocation decisions is rather modest to low (15, 16, 49-51). This has led some researchers to ask why this is the case. Since the publication of the first economic evaluation study in health decision-making in the 1960s, the number of published studies has grown remarkably (11, 48, 52-55). Economic evaluation has been used in healthcare decision-making in several contexts such as: the state of Oregon's plan to reduce inequity of access for non-insured persons in the state through revising entitlement to its Medicaid program (56); the inclusion of an official requirement for economic analysis as a basis for reimbursement and pricing of new technologies (mainly pharmaceuticals) in Australia (57) and several provinces of Canada (58); the use of economic techniques in technology assessments undertaken by the National Institute for Clinical Excellence (NICE) in England and Wales (59); and the use of economic modeling by the Health Technology Board in Scotland and similar jurisdictions in the Netherlands³⁴, Sweden and Norway (60) and Australia (61, 62).

Velden *et al.* (63) described that this growth can be explained by the introduction of methodological guidelines for economic evaluation, which are mostly linked to mandatory requirements for reimbursement of new pharmaceuticals. Yet, the majority of studies found very little evidence of any systematic influence of economic evaluation on policy decision-making and resources allocation (15). Researchers argued that one of the most important barriers is most likely decision-context-related (including limited knowledge of economic evaluation methodologies and lack of experts to evaluate relevant studies). For example, the second EUROMET project (2004) confirmed that, unavailability of data and lack of enough expertise are as significant shortcomings accounts for the limited application of economic evaluation methods in decision-making (60). Duthie *et al.*(11) also pointed to decision-makers' lack of understanding of the economic evaluation modeling and economists' jargon at the local level at the local level of healthcare administration in their country.

There is some evidence to suggest that familiarity with economic evaluation concepts would enable decision-makers to better set up, maintain and implement decision practices (11, 47, 50). In their quantitative study, Fattore and Torbica, agreed that informed Italian health decision-makers – those who are not involved in clinical activities, and are away from individual patients – have an optimistic attitude toward the economic evaluations. Leander (64) has also argued that economic appraisal has the potential to address questions of both efficiency and equity, while often efficiency is, or appears to be, the key concern.

5. Discussion

Despite the growing body of published researches and encouragement of authorities to take into account economic evaluation studies, any systematic effect of such evidence on healthcare decision-making in I.R. Iran seems to be limited. It would appear that economic evaluation, as presently applied, is underused in its influence on policy and allocation decisions. It is evident that decision-makers are increasingly aware of resources scarcity, competing claims on resources allocation, and that choices and trade-offs have to be made and, that economic evaluation can be a valid aid (65, 66). However, little is known about the precise application of economic evaluation at multiple levels of healthcare services management. Limited use of economic evaluations may reflect a lack of familiarity with or inadequate knowledge of economic evaluation methodologies. What the literature to date lacks is an understanding of how Iranian policy-makers interpret and enact the various economic concepts embedded within decision-making situations. Understanding how policy-makers interpret and employ the multiple economic concepts of policy decisions will potentially generate a basis for informing decision-making practice. More training in health economics would help decision-makers overcome some of resources allocation difficulties.

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Authors' Contribution

A.B. conceived and designed the study, contributed to the narrative review and data extraction, performed the analysis and interpreted the results. S. E. drafted the manuscript and contributed to the data extraction.

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