WEEKLY EPIDEMIOLOGICAL REPORT

A publication of the Epidemiology Unit
Ministry of Health

231, de Saram Place, Colombo 01000, Sri Lanka
Tele: + 94 11 2695112, Fax: +94 11 2696583, E mail: epidunit@sltnet.lk
Epidemiologist: +94 11 2681548, E mail: chepid@sltnet.lk
Web: http://www.epid.gov.lk

Vol. 39 No.23 **02nd – 08th June 2012**

WEER SRI LANKA - 2012

Cost-Effectiveness (Part I)

This is the first of two articles on Cost-effectiveness. The first article describes the calculation of both independent and mutually exclusive events and the second article will describe the application of cost-effectiveness analysis.

Introduction

Cost-effectiveness analysis compares the costs and health effects of an intervention to assess the extent to which it can be regarded as providing value for money. This informs decision makers who have to determine where to allocate limited healthcare resources. Cost-effectiveness is only one of a number of criteria that should be employed in determining whether interventions are made available. Issues of equity, needs and priorities should also form part of the decision-making process. The term cost-effectiveness has become synonymous with health economic evaluation and has been used (and misused) to depict the extent to which interventions measure up to what can be considered to represent value for money. Strictly speaking, however, cost-effectiveness analysis is one of a number of techniques of economic evaluation, where the choice of technique depends on the nature of the benefits specified. Cost-effectiveness analysis has been defined by the National Institute for Health and Clinical Excellence of United Kingdom (NICE) as an economic study design in which consequences of different interventions are measured using a single outcome, usually in 'natural' units (e.g. life-years gained, deaths avoided, heart attacks avoided or cases detected). Alternative interventions are then compared in terms of cost per unit of effectiveness. As with all economic evaluation techniques, the aim of cost effectiveness analysis is to maximize the level of benefits – health effects – relative to the level of resources available. In cost–utility analysis (another popular method of economic evaluation) the benefits are expressed as quality-adjusted life years (QALYs) and in cost–benefit analysis in monetary terms. All cost-effectiveness analyses should be subjected to sensitivity analysis, which should be included as part of the reporting of the findings.

What constitutes a cost?

Costs are seen differently from different points of view. In economics, the notion of cost is based on the value that would be gained from using resources elsewhere –referred to as the opportunity cost.

In other words, resources used in one programme are not available for use in other programmes and as a result, the benefits that would have been derived have been sacrificed. It is usual, in practice, to assume that the price paid reflects the opportunity cost and to adopt a pragmatic approach to costing and use market prices wherever possible. In cost-effectiveness analysis it is conventional to distinguish between the direct costs and indirect (productivity costs) associated with the intervention, as well as what are termed intangibles, which, although they may be difficult to quantify, are often consequences of the intervention and should be included in the cost profile.

Direct costs:

Medical: drugs; staff time; equipment.
Patient: transport; out-of pocket expenses.

Productivity costs: production losses; other uses of time.

Intangibles: pain; suffering; adverse effects.

It is essential to specify which costs are included in a cost-effectiveness analysis and which are not, to ensure that the findings are not subject to misinterpretation.

Contents	*Page*

How to use cost-effectiveness analysis

A distinction must be made between those interventions that are completely independent –that is, where the costs and effects of one intervention are not affected by the introduction or otherwise of other interventions – and those that are mutually exclusive –that is, where implementing one intervention means that another cannot be implemented or where the implementation of one intervention results in changes to the costs and effects of another. For independent interventions, average cost -effectiveness ratios suffice, but for mutually exclusive interventions, it is essential to use incremental cost-effectiveness ratios, if the objective (to maximize healthcare effects with available resources) is to be achieved.

Independent programmes using cost-effectiveness analysis requires that cost-effectiveness ratios (CERs) are calculated for each programme and placed in rank order.

$$\text{CER} = \frac{\text{Costs of intervention}}{\text{Health effects produced (e.g. life years gained)}}$$

According to cost-effectiveness analysis, programme with the lowest CER value should be given priority over the others (refer Table 1); however, in order to decide which programme to implement, the extent of resources available must also be considered (refer Table 2) .If a new programme becomes available, it should be considered on the basis of its CER figure. Resources for the new programme should also be considered in the same manner as above.

Mutually exclusive interventions

In reality, the likelihood is that choices will have to be made between different treatment regimens for the same condition, different dosages or treatment versus prophylaxis –that is, mutually exclusive interventions. The key question is: what are the additional benefits to be gained from the new therapeutic intervention and at how much greater cost? In order to answer such a question, **incremental cost-effectiveness ratios (ICERs)** are used.

$$\text{ICER} = \frac{\text{Difference in costs between Programmes P1and P2}}{\text{Difference in health effects between Programmes P1and P2}}$$

The alternative interventions are ranked according to their effectiveness – on the basis of securing maximum effect rather than considering cost–and ICERs are calculated as shown in Table 3.The least effective intervention (P1) has the same average CER as its ICER, because it is compared with the alternative of 'doing nothing'.

$$\text{ICER for P2} = \frac{\text{Cost of P2} - \text{Cost of P1}}{\text{Effect of P2} - \text{Effect of P1}}$$

$$= \frac{100{,}000 - 125{,}000}{1{,}500 - 1{,}300}$$

$$= -\frac{25{,}000}{200}$$

$$= -125$$

Compiled By Dr. Madhava Gunasekera of the Epidemiology Unit

Source-What is Cost-effectiveness – available from

http://www.medicine.ox.ac.uk/bandolier/painres/download/whatis/Cost-effect.pdf

Table 2. The extent of resources

Budget available	Programme(s) to be implemented
<150,000	As much of programme Z as budget allows All of programme Z
150,000	All of programme Z budget allows
150,000–250,000	All of programme Z and as much of X as budget allows
250,000	All of programmes Z and X All of programmes Z and X and as much of Y
250,000–370,000	All of programmes Z and X and as much of Y as budget allows
370,000	All 3 programmes

Table 3. Incremental cost-effectiveness ratios

Programme	Cost[C]	Effects (life years gained) [E]	Incremental cost[ΔC]	Incremental effect [ΔE]	ICER [ΔC/ ΔE]
P1	125000	1300	125 000	1300	96.15
P2	100000	1500	–25 000	200	-125
P3	160000	2000	60 000	500	120
P4	140000	2200	–20 000	200	-100
P5	170000	2600	30 000	400	75

Table1.Cost-effectiveness of three independent programmes

Programme	Cost [C]	Health effect] (life-years gained) [E]	Cost-effectiveness ratio [C/E]
Z	150 000	1 850	81.08
x	100 000	1 200	83.33
y	120 000	1 350	88.89

to be continued

Table 1: Vaccine-preventable Diseases & AFP

26th May – June 01st 2012 (22nd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Acute Flaccid Paralysis	00	00	00	00	01	00	00	00	00	01	01	36	38	- 05.3 %
Diphtheria	00	00	00	00	00	00	00	00	00	-	-	-	-	-
Measles	00	00	00	00	00	00	00	00	00	00	03	20	42	- 52.4 %
Tetanus	00	00	00	00	00	00	00	00	00	00	00	05	12	- 58.3 %
Whooping Cough	00	00	00	00	00	00	00	00	00	00	00	33	10	+ 230.0 %
Tuberculosis	07	05	16	02	21	07	00	10	28	96	359	3668	3952	- 07.2 %

Table 2: Newly Introduced Notifiable Disease

26th May – June 01st 2012 (22nd Week)

Disease	No. of Cases by Province									Number of cases during current week in 2012	Number of cases during same week in 2011	Total number of cases to date in 2012	Total number of cases to date in 2011	Difference between the number of cases to date in 2012 & 2011
	W	C	S	N	E	NW	NC	U	Sab					
Chickenpox	00	00	00	01	00	01	00	00	00	002	60	1988	2159	- 07.9 %
Meningitis	00	00	00	00	00	01 KN=1	00	00	01 KG=1	02	16	239	396	- 39.6 %
Mumps	00	00	00	00	00	01	00	00	01	02	51	1909	1063	+ 79.6 %
Leishmaniasis	00	00	00	00	00	00	00	00	00	00	08	260	289	+ 10.0 %

Key to Table 1 & 2

Provinces: **W**: Western, **C**: Central, **S**: Southern, **N**: North, **E**: East, **NC**: North Central, **NW**: North Western, **U**: Uva, **Sab**: Sabaragamuwa.

DPDHS Divisions: **CB**: Colombo, **GM**: Gampaha, **KL**: Kalutara, **KD**: Kandy, **ML**: Matale, **NE**: Nuwara Eliya, **GL**: Galle, **HB**: Hambantota, **MT**: Matara, **JF**: Jaffna, **KN**: Killinochchi, **MN**: Mannar, **VA**: Vavuniya, **MU**: Mullaitivu, **BT**: Batticaloa, **AM**: Ampara, **TR**: Trincomalee, **KM**: Kalmunai, **KR**: Kurunegala, **PU**: Puttalam, **AP**: Anuradhapura, **PO**: Polonnaruwa, **BD**: Badulla, **MO**: Moneragala, **RP**: Ratnapura, **KG**: Kegalle.

Data Sources:

Weekly Return of Communicable Diseases: Diphtheria, Measles, Tetanus, Whooping Cough, Chickenpox, Meningitis, Mumps.

Special Surveillance: Acute Flaccid Paralysis.

Leishmaniasis is notifiable only after the General Circular No: 02/102/2008 issued on 23 September 2008.

Dengue Prevention and Control Health Messages

Check the roof gutters regularly for water collection where dengue mosquitoes could breed.

Table 4: Selected notifiable diseases reported by Medical Officers of Health

26th May – June 01st 2012 (22nd Week)

DPDHS Division	Dengue Fever / DHF*		Dysentery		Encephalitis		Enteric Fever		Food Poisoning		Leptospirosis		Typhus Fever		Viral Hepatitis		Human Rabies		Returns Received
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	%
Colombo	67	3043	0	45	0	5	2	84	0	24	1	61	0	2	0	23	0	1	**08**
Gampaha	0	2197	0	31	0	5	0	32	0	13	0	77	0	6	0	101	0	0	**00**
Kalutara	0	788	0	35	0	2	0	17	0	3	0	92	0	2	0	9	0	1	**00**
Kandy	0	692	0	35	0	1	0	11	0	11	0	25	0	63	0	12	0	0	**00**
Matale	0	180	0	37	0	4	0	7	0	4	0	18	0	2	0	10	0	0	**00**
Nuwara	0	124	0	56	0	1	0	17	0	1	0	12	0	29	0	8	0	0	**00**
Galle	0	449	0	36	0	3	0	6	0	10	0	59	0	21	0	1	0	0	**00**
Hambantota	1	206	0	18	0	1	0	2	0	9	0	26	0	21	0	5	0	0	**08**
Matara	0	558	0	29	0	4	0	9	0	15	0	63	0	35	0	48	0	0	**00**
Jaffna	0	199	1	82	0	6	1	170	0	18	0	2	0	232	0	3	0	0	**17**
Kilinochchi	0	20	0	6	0	1	0	18	0	39	0	3	0	26	0	4	0	1	**0**
Mannar	0	69	0	10	0	2	0	13	0	13	0	15	0	35	0	1	0	0	**0**
Vavuniya	0	26	0	6	1	18	0	4	0	4	0	14	0	0	0	1	0	0	**50**
Mullaitivu	0	5	0	8	0	1	0	4	0	1	0	2	0	5	0	0	0	0	**25**
Batticaloa	5	535	1	55	0	2	0	11	4	29	0	4	0	0	0	4	1	2	**43**
Ampara	0	35	0	40	0	0	0	3	0	5	0	16	0	0	0	1	0	0	**0**
Trincomalee	0	81	0	67	0	1	0	15	0	1	0	24	0	3	0	2	0	0	**17**
Kurunegala	5	521	0	51	0	6	0	43	0	9	0	61	0	16	1	31	0	2	**13**
Puttalam	0	330	0	23	0	4	0	5	0	1	0	19	0	8	0	1	0	0	**0**
Anuradhapu	3	146	1	28	0	1	0	3	0	1	0	45	0	18	0	30	0	1	**11**
Polonnaruw	0	80	0	11	0	0	0	1	0	0	0	17	0	2	0	26	0	1	**00**
Badulla	0	87	0	30	0	2	0	14	0	1	0	16	0	24	0	18	0	0	**00**
Monaragala	0	73	1	31	0	4	0	9	0	0	0	36	0	37	0	86	0	1	**09**
Ratnapura	43	687	2	89	0	23	1	29	0	2	0	115	0	18	0	48	0	1	**17**
Kegalle	6	613	0	27	0	6	0	12	0	5	0	51	0	28	0	203	0	0	**09**
Kalmune	0	123	0	81	0	1	0	5	0	26	0	2	0	0	0	6	0	1	**00**
SRI LANKA	**130**	**11867**	**06**	**967**	**01**	**104**	**04**	**544**	**04**	**245**	**01**	**875**	**00**	**633**	**01**	**682**	**01**	**12**	**08**

Source: Weekly Returns of Communicable Diseases WRCD).
***Dengue Fever / DHF** refers to Dengue Fever / Dengue Haemorrhagic Fever.
****Timely** refers to returns received on or before 26th May, 2012 Total number of reporting units 329. Number of reporting units data provided for the current week: 25
A = Cases reported during the current week. **B** = Cumulative cases for the year.

PRINTING OF THIS PUBLICATION IS FUNDED BY THE WORLD HEALTH ORGANIZATION (WHO).

Comments and contributions for publication in the WER Sri Lanka are welcome. However, the editor reserves the right to accept or reject items for publication. All correspondence should be mailed to The Editor, WER Sri Lanka, Epidemiological Unit, P.O. Box 1567, Colombo or sent by E-mail to **chepid@sltnet.lk.**

ON STATE SERVICE

Dr. P. PALIHAWADANA
CHIEF EPIDEMIOLOGIST
EPIDEMIOLOGY UNIT
231, DE SARAM PLACE
COLOMBO 10